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THE

TWENTY-THIRD ANNUAL REPORT

OF THE

CAMBRIDGE WATER BOARD

TO

THE CITY COUNCIL.

TOGETHER WITH THE

REPORTS OF THE REGISTRAR AND SUPERINTENDENT,
AND OTHER DOCUMENTS.

FOR THE YEAR 1887.

CAMBRIDGE:
HARVARD PRINTING COMPANY, PRINTERS.
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REPORT

OF THE

CAMBRIDGE WATER BOARD.

To the Honorable City Council of the City of Cambridge:

THE Water Board herewith submits to you its twenty-third annual report, being for the year ending November 30th, 1887.

Total Cost of the Water Works.

Cost of the Works, Nov. 30th, 1886, as per last year's report	$2,294,043 39
Expended during the year ending Nov. 30, 1887	142,453 11
Making the total expenditure	$2,436,496 50

Water Bond Account.

Whole amount of bonds issued	$2,366,900 00
Amount paid from the Sinking Fund . . .	541,400 00
Leaving unpaid Water Loan	$1,825,500 00
From this deduct the present value of the Water Loan Sinking Fund as per Trustee's Account	838,597 01
Leaving the balance of the Water Loan yet to be provided for by the Sinking Fund .	$986,902 99

Statement showing in brief the transactions in connection with the Water Works for the year ending Nov. 30th, 1887.

General Construction Account.

RECEIVED.

From excess of rates, fines, etc.	$19,556 35	
From refund of overcharge . .	7 50	
		$19,563 85

EXPENDED.

Amount expended on general construction account	19,563 85

Stony Brook Construction Account.

RECEIVED.

Balance of appropriation of 1886	$18,192 46
Amount of Water Bonds issued	95,000 00
Premium on sale of the same	812 50
Allowance made by R. D. Wood & Co., in settlement for cracked and light pipes . .	287 22
Sale of tickets, contractors, etc., from Boston to Roberts	42 00
	$114,334 18

EXPENDED.

On Stony Brook account	$111,363 26
Balance unexpended carried to new account .	2,970 92
	$114,334 18

Fresh Pond Land Purchase, etc.

RECEIVED.

Balance of appropriation of 1886	$28,020 20
Premium on sale of $15,000 bonds	112 50
	$28,132 70

EXPENDED.

For purchase of sundry estates bordering on Fresh Pond, examination of titles, etc., .	$11,526 00
Balance unexpended carried to new account .	16,606 70
	$28,132 70

During the past year the Water Board made a purchase of Childs' ice house on the westerly side of the Pond, while other interested parties purchased his business.

Also arrangements were made by which we purchased Mrs. Black's ice houses, and about two acres of her land. By this means we were relieved from the obligation to maintain a sluiceway in our dam at Black's Nook, and a canal to float the ice to her houses. The ice houses are now entirely removed from the borders of the Nook, and the city owns all the land around the borders of the same. It will thus be seen that there are but two ice privileges remaining on the borders of the Pond, namely the Boston Ice Company's formerly Tudor Co.'s, and the Fresh Pond Ice Company's formerly Hittinger's. Were these disposed of, the Pond would be clear of any business that would contaminate our water supply in connection with the Pond itself.

The slaughtering establishment of Niles Bros. on the other side of Concord Avenue from our Pond, it is believed by our State Board of Health, has already polluted the water in our Wellington Brook conduit; certainly the smell from the place is a nuisance to the whole neighborhood, and the whole business is a most undesirable one to be carried on so near our reservoir. We think vigorous steps should be taken by the City Council through the Board of Health or otherwise, to remedy this matter and abate the nuisance.

Water Rates, Fines and Supply Account.

RECEIVED.

From Water Rates	$206,538 46	
Less rates refunded . . .	1,789 82	
Amount carried forward .		$204,748 64

Amount brought forward .		$204,748 64
Shutting off and letting on water, seals, fines and rent	$456 50	
From supply account . . .	6,138 99	
Accrued interest on $110,000 Bonds sold	172 22	
Maintenance account . . .	861 19	
Construction account . . .	7 50	
		$7,636 40
		$212,385 04

EXPENDED.

For general construction acc't	$19,563 85	
For maintenance account . .	37,610 62	
For supply account	4,714 05	
For interest on Water Loan .	97,355 00	
Paid into the Sinking Fund, being 3 per cent on $1,715-500	51,465 00	
Surplus of 1887, to Sinking Fund	1,676 52	
		$212,385 04

Comparative Receipts.

Water-rates for the year ending Nov. 30, 1887	$204,748 64
Water-rates for the year ending Nov. 30, 1886	199,404 43
Showing excess of water-rates in 1887 . .	$5,344 21

Water Supplied.

Amount of Water pumped in 1887 . . .	1,409,410,931 gallons
Amount of Water pumped in 1886 . .	1,235,558,878 gallons
Showing an increase in 1887 . . .	173,852,053 gallons

This is the largest amount of water ever pumped in one year, showing a daily average increase of 476,307 gallons over the preceding year.

The daily increase in 1885 over 1884, was	448,968 gallons
The daily increase in 1886 over 1885, was	302,209 gallons
The daily increase in 1887 over 1886, was	476,307 gallons

This shows the growth of our city, in the consumption of water from year to year, and is conclusive proof that our additional supply was indispensable and has come none too soon.

How the Water is Used.

Amount sold by meter and used for watering the streets, in gallons	362,547,100
Amount used for domestic, fire and other purposes, in gallons	1,046,863,831
Making the total in gallons	1,409,410,931
Daily average pumping for the year	3,861,400 gallons

Daily average high surface	332,412 gallons
Daily average low service	3,528,988 gallons
	3,861,400 gallons

Our high service is furnished through a stand pipe, while the low service is drawn direct from the reservoir. The difference in the levels between full stand pipe and full reservoir, is about 40 feet. We find the high service to work with entire satisfaction, and it is indispensable for furnishing water to the high lands and high buildings in the city.

Rainfall and Height of Water in the Pond.

MONTHS.	RAINFALL.			WATER IN THE POND BELOW HIGH-WATER MARK.		
	1885.	1886.	1887.	1885.	1886.	1887.
	Inches.	Inches.	Inches.	Feet.	Feet.	Feet.
December, 1886	4.60	1.82	5.23	7.68	10.13	10.37
January, 1887	5.43	6.41	5.28	7.71	9.67	10.80
February, "	2.94	7.35	4.66	7.61	6.29	9.95
March, "	1.06	3.49	4.46	6.72	3.83	9.52
April, "	3.61	2.43	3.94	6.42	3.21	9.04
May, "	3.77	3.92	1.79	6.35	3.55	9.30
June, "	4.10	1.48	1.86	6.94	4.31	10.20
July, "	1.72	3.54	4.19	7.91	5.45	11.61
August, "	5.21	3.20	4.10	9.07	6.40	12.68
September, "	1.78	4.64	1.36	9.95	7.59	12.73
October, "	5.56	3.62	3.22	10.69	3.87	12.66
November, "	9.20	4.22	3.90	10.69	9.62	12.05
Total for the year.	48.98	46.12	43.99	8.15	6.58	10.91

It will be seen by this table that the rainfall this year is a little less than for the two previous years, but not much. It will also be seen that from May to August, the Pond fell more than one foot per month, the difference of the height for three months being about 3 feet, 5 inches. At that time it became necessary to waste the water at Stony Brook dam, as the water came up so high as to interfere with finishing the work on the dam; so the pipes were opened and the water wasted into Fresh Pond as soon as the excavating of the bottom of the Pond was done. By this means the water we needed was furnished until it was shut off in October, when the Pond continued to fall again until November 5, when it had fallen to a point more than 13½ feet below high-water mark, a much lower point than ever seen before, and we hope and expect it was lower than it will ever be seen again. Since November 5, when the water was let on in the presence of the City Council and invited guests, it has run through our fountain continuously and the Pond has risen at the rate of about one foot per week, besides furnishing our daily pumping supply.

This result, we think, demonstrates the estimates made by our engineers, that our thirty-inch main will deliver into the Pond from Stony Brook more than nine million gallons of water daily. After a few days more we shall stop pumping on the border of the Pond, and so far as we can see, shall have no more use for the auxiliary pumping station, and the same can be removed, the machinery moved out and sold, and the building taken down, the old lumber used elsewhere or sold as may be deemed best.

It is now proposed to let the water run into the Pond until we reach grade ten, which will give water enough for the use of ice cutting, and for our pumping direct from the Pond at our Engine House. We then propose to reduce the flow of water through the fountain so as to supply what we take out daily, holding the water at grade ten, until the spring freshets, when we will again open the pipe to its full capacity, and fill up the Pond to as high a point as it is advisable to have it, where we shall keep it until the water runs low in Stony Brook next summer, when we shall have a full Pond to draw from until the fall rains come again.

Fresh Pond Reservoir.

In our last year report, after describing what had been done in riprapping the banks about the Pond except in front of the Ice Companies, we said: "If Cambridge Nook and Boat House Nook were deepened two or three feet, we should have all we could desire in Fresh Pond Reservoir." The importance of doing this work before letting in the water from Stony Brook, was so much impressed upon the Water Board that they requested the City Council to authorize them to do it, at an estimated cost of thirty thousand dollars. The appropriation was granted, and during the past season those nooks have been excavated to grade seven or less, and the work done within the estimate. This being done, will give us a depth of water in all parts of the Pond of not less than nine feet when the Pond is full, or at grade sixteen. In addition to deepening the Pond, we have been able to grade up the Park where the old Wythe ice house was, and other places about Cambridge Nook. The balance of the material was put into Black's Nook, thus making a substantial beginning towards filling up this disagreeable place.

The improvements around the Pond in connection with letting on the new water supply have been the means of attracting many of our citizens to the place who have never been there before, and others who have been there in years past, come and can hardly believe what they see now, the change has been so great; but in one thing, so far as we have heard, they all agree, which is, that the right thing has been done as far as we have gone, in improving the City's well from which comes all our water. It only remains now for us to secure for the City the immediate surrounding of the Pond, and thus prevent any danger of contamination in the future.

There are many places around the Pond that ought to be gradually graded up to near high-water mark, in order to prevent stagnant waters standing around the borders of the Pond, which are both unhealthy and unsightly. Among these places may be named the balance of Black's Nook, Gay's Nook, Bright's Nook, and the low swamp on land southeast of the Pond, into which the drainage from Richardson's Pond, in Belmont, now empties; all these should ultimately be graded up as herein proposed, and drainage provided for Richardson's Pond, and that part of Belmont near there to prevent it running into the Pond.

There is another source of pollution, which already many of our citizens protest against; that is the use of 50 or more horses, used in the winter on the pond during the ice-cutting season. We are doing all we can to remedy this by employing boys who go around the Pond after the horses, with box sleds and gather up all the solid material that is dropped, that can be removed, but other sources of defilement from the horses cannot be gathered up, and this must continue to go into our water supply as long as horses are used upon the Pond. We are of the opinion that at no distant day, the people of Cambridge will demand that all such business shall be removed from their reservoir. When the time comes to carry out these improvements in part, or the whole, it will be necessary for the City to have additional legislative powers for acquiring the necessary lands around Fresh Pond, and we shall ask the City Council to petition the next General Court for such additional power and authority as may be needed, to be used at the discretion of the City Council.

Stony Brook Dam and Reservoir.

We are happy to report this year that that long continued work is now done, and has been approved by our engineers, and is pronounced "a first-class job." We do not see how it could have been done better than it has been, and we feel that we can rest in the conviction that it will never wash away, or give us any trouble. It has never yet been filled up, but as far as it has been filled, within some eight feet of the top of the dam, no signs of leakage have been discovered.

The water was permanently let into Fresh Pond, November 5, since which time the Pond has filled about one foot per week, while at the same time the Stony Brook Reservoir, although only about one-sixth the size of Fresh Pond has fallen but very little, showing conclusively that Stony Brook is now at the end of a dry season, and before the fall of any snow, furnishing us with nearly as much water as our conduit will bring to us, which is something more than nine million gallons of water daily.

The Gate House at the dam is nearly completed. A man with a family, who occupy the building that has been used by our engineers, has been engaged to tend the gate-house, clean the screens, and to take general charge of our property at, and about, the dam and reservoir. Telephone connections have also been made with the house at the dam, our engine house, and the water office at City Hall, and soon will be with our Superintendent's house, and as this is also connected with the general telephone system running to Waltham and Roberts' Mill, we have the means now in hand to communicate with all parts of our Stony Brook system, should an accident at any time occur which demanded our immediate attention.

Work to be done.

First. To make needed repairs in the wall of our Reservoir, and build a chronograph house near the stand pipe for nightly observation of the consumption of water, in connection with the detection of leaks and the waste of water. This we recommended last year, but the press of more important matters prevented our doing it the past year; we do not think this work should be longer delayed.

Second. For general construction account.

Third. For maintenance account.

840058

Fourth. For supply account.

Fifth. For such further improvements around Fresh Pond as the City Council may approve.

For further particulars and details in regard to what has been done the past pear, and the present condition of the works, we would refer you to the Superintendent's and Registrar's reports made to us, which we transmit herewith as part of our report to you.

In closing we wish to commend the City Engineer and those employed in his office for their courtesy to us in responding cheerfully to all our demands on them, and also to commend our City Solicitor who has had much work to do in connection with the suits growing out of our land and water takings. We think he has, and is handling them wisely for the interest of the City.

And last, but not least, we commend the faithfulness of our Superintendent and Registrar in particular, and those working under them in a general manner for the discharge of their various duties.

At the completion of the work at Stony Brook, a formal celebration of the auspicious event took place. It was held on a beautiful day, November 5, 1887, and will be long remembered by those who took part in it, representing as they did more than sixty thousand people, whose necessities had that day been provided for, for many years to come.

A somewhat detailed account of the Stony Brook system was published in the *Cambridge Tribune*, a week before the formal celebration, and all the Cambridge papers published an account of the celebration itself. We have thought it would be well to embody these in our report this year for future reference, and that our children may know something definite of the work that was done in our day to furnish them with the water they will be using after we are gone. We have therefore added these statements to our report and they are herewith transmitted.

All of which is respectfully submitted,

C. W. KINGSLEY,
L. M. HANNUM,
JOHN F. O'BRIEN,
K. S. CHAFFEE,
JAS. M. W. HALL,
WM. E. RUSSELL,
JOHN H. CORCORAN,

Cambridge Water Board.

THE STONY BROOK WATER SUPPLY.

Its Opening to be Celebrated Today — How the Great Work has been done — What the City and its Guests will do Today.

Few people are there in Cambridge who have any adequate idea of the work which has been carried on at Stony Brook for the past three years by the Cambridge Water Board, in establishing a future and extended supply of water for the City. Fewer still can appreciate the magnitude and thoroughness of the job, even after an inspection. Though not yet fully completed in some matters of detail, the job is essentially finished, and will be officially dedicated today. The need and wisdom of seeking a new supply of water beyond Fresh Pond has long since ceased to be questioned, although at the outset of the agitation in regard to the subject many people believed it a piece of reckless extravagance. To the doubters of today, and they are few, what ought to be convincing arguments for conversion to the side of the believers in the water works extension is an examination of the low state of Fresh Pond at present, and an acquaintance with the facts in regard to its comparative condition. The necessity of a further supply has been demonstrated more vividly than ever the past summer, in fact, the supply itself will not be ready for use any too soon, having even been called into requisition already.

Location of the Stony Brook Supply.

The location of the new supply is partly in Weston and partly in Waltham, and is what is known as the Stony Brook basin, or more locally, the Roberts Mill Pond. It is seven miles from Fresh Pond by way of the line of pipe which connects the two basins. It was selected because of its availability, natural advantages and good quality of water.

The source of Stony Brook is near Sandy Pond, Lincoln. Its course lies in a southerly direction, passing through Lincoln and Weston and forming the line between Weston and Waltham. Its outlet is the Charles River. During two thirds of the year, the stream flows placidly along, but in spring, when the winter's accumulation of ice and snow is melted and poured into its channel, it becomes almost a torrent. Although not over five miles in length, so tortuous is its course and so hilly the country through which it passes that its watershed area is something more than 23 miles, and, though its confines are very narrow, a great quantity of water is yearly discharged into the river.

The only use which has lately been made of the water from the brook was to run the asbestos paper mills of W. Roberts, located on South street, which crosses the brook 350 feet below the present dam and only a few hundred feet from the river. Originally there were several dams along the course, but when the city commenced its operations that at Roberts mill was the only one in use. It is the basin above this dam selected as the reservoir for the Cambridge supply. The new dam built by the city, as has been said, is 350 feet above the bridge in front of Roberts mill, leaving a pretty sheet of water between the two. The basin or reservoir extends a mile and a quarter to the north and varies in width from 200 to 800 feet.

Construction of the Dam and Basin.

The shores of the basin are wooded. clearings having been made in the vacinity of the dam and for a few feet above high-water mark all the way around. The Water Board commenced work on the basin in the spring of 1885. It was not begun auspiciously, as the contractors who had been awarded the job, Kiernan & Grace, threw up the sponge after a month's operations, claiming that the city had not done as it had agreed and furnished work on the foundation of the dam fast enough to keep the men of the contractors constantly employed. The city claimed that this was not true, and a suit grew out of the trouble, and work was for a short time stopped at the dam. The auditor selected by the court awarded Kiernan & Grace $5,000 for the work they had accomplished and for the damages sustained by them. The contract was then awarded to H. H. Pike & Son. That firm began work where the first firm left off in the latter part of September 1885, and has continued since then energetically and without a break.

The building of the dam was the most important work of all that has been accomplished. The first step, however, was the drawing off of the water that was in the basin and the excavating of the mud on the bottom. Over 70,000 cubic yards were removed. Then a trench was dug for the site of the dam. The character of the soil was gravelly and clayey, with deposits of boulders here and there, as if some time the spot had been above water and the boulders had been dumped into pits in the earth. It was at first proposed that this trench should be about fifteen feet wide and ten feet deep, but so extensive was the deposit of boulders that, in many places, in order to reach the quicksand in which to drive the piling, it was necessary to go down to a depth of twenty-five feet, and thus at points this trench was made forty or fifty feet wide at the top and about fifteen feet wide at the bottom.

Piles thirty feet in length were then driven by a 500-pound hammer. The piles were groved together like matched boards, forming a water-tight barrier. This formed the first foundation of the dam. In the trench above the piling was then built a concrete foundation four feet thick and twelve wide. On this rested the core wall, with a base eight feet in width, rising to a height of seventy feet, and tapering off with a width of three feet. The core wall was built in two columns, with a chamber running down in the middle. Each column was first made water-tight and then the aperture between was filled with stone paving and the crevices filled with grout, making in itself another water-tight wall. After the commencement of the core wall, the body of the dam was begun.

The filling used was composed of sand, gravel and boulder clay, and as it was laid, was wet and rolled, and thus made perfectly water-tight. Nearly 100 feet of this were placed on each side of the core wall on the bottom of the pond, and this was gradually tapered until the width on each side at the top was ten feet. This makes the dam 200 feet wide at the bed of the pond, and 20 feet wide at the upper part. It extends in a generally northerly and southerly direction across the line between Weston and Waltham, and the main portion is 800 feet long, while the wings constitute 300 more feet, making a total length of dam laid 1100 feet. From the bottom of the piling to the top of the dam the height is 85 feet, and from the bed of the pond to the top it is 36 feet. This will allow for a depth of water at the dam of 30 feet, and will be an increase of 20 feet in depth over the entire water area of the old mill pond between the Stony Brook station and South street. In filling in the dam 80,000 yards of material were used, and in the core wall there are 5000 yards of masonry. On the top of the dam there is a walk eight feet wide running from the Waltham side to the gate-house Each side of this way for a distance of six feet, or to the brink of the dam, and the entire down-stream side of the dam, are sodded. Beneath the berme on the lower side of the dam, facing the street, are two supply pipes leading from the gate-house to the end of the dam, where they merge into one which extends to Fresh Pond. There is a roadway 12 feet wide across this berme, each side of which is also sodded. Three flights of granite steps lead from the south extremity of the roadway next to the waste sluiceway up to the gate-house.

Site of the Gate-House,

The site of the gate-house for the basin was determined by a very curious geological formation on the Weston side of the pond. From the upper end of the basin the channel of the brook follows a course almost in the central part of the valley, until, at about one-fourth of a mile above the site of the dam, it turns to the right and flows nearly under the bank of the Weston side. About 800 feet above the dam, however, it suddenly turns, and making almost a complete right angle, crosses to the Waltham side, and there after flowing in a straight course for about 100 feet, turns again and flows through the centre of the valley to the dam. The dam crosses the basin where the channel is near the Waltham bank, and naturally the gate-house would be placed at that side, especially as the pipes from Fresh Pond enter there, were it not for the geological formation on the Weston side. This formation is an immense ledge of red granite, out of which was blasted a space sufficient to hold the chambers of the gate-house. This makes it impossible for the water to penetrate under or around the foundation, and gives as solid a foundation and as tight chambers as it is possible to obtain under any circumstances.

The Gate Chambers.

The gate-house proper is 25x31 feet square, and is one-story high from the upper level of the dam. Below it, chambers—of which there are five—extend to a depth of about thirty-two feet. The gate-house and its chambers are built entirely of granite, cut especially for the purpose in Marlboro, N. H. Of the five chambers, two will be used for waste water and the other three when it is desired to fill up Fresh Pond. In the first chamber will be the sluice gate, 5x6 feet, which will be opened to permit the water to escape when the overflow is unable to carry it in sufficient quantities. This will be necessary only on rare occasions, when there is a freshet, or when it is desirous to drain the pond for repairs, etc. The second chamber is a waste chamber, and will be used only to control the rush of water before it enters the archway just beyond, in its flow to the lower stream. The third chamber will be used to admit the water destined to be carried to Fresh Pond. In this chamber will be three small gates, 3x3 feet, one above the other, to admit the water. The object of three gates is that at times the water is better and clearer at different heights in the pond. Thus, when that in the upper part is superior, it can be admitted through the upper gate; when it is better at a medium height, it can enter through the middle gate, and when it is preferred from the bottom part, it can be allowed to run in at the lower gate. In the chamber beyond this are arranged the sets of screens which will prevent the entrance of any débris that might be carried in that direction into the gates. In the last chamber are the water gates which control the supply of water to be carried to Fresh Pond. There are two of these gates, one connected with a 36-inch pipe, and the other with a 30-inch one, the object of two gates being that if it were ever found desirable to connect a second pipe with the basin, it could be done without breaking into the chambers. The two pipes connected with the two gates run only as far as the Waltham end of the dam, where they are connected with one 36-inch pipe, which runs to the Waltham pumping station a mile or more distant, where the 30-inch pipe begins, continuing to Fresh Pond.

The Waste Sluiceway and Overflow.

Just beyond, and connected with the second or waste chamber, is the archway that carries the waste water under the dam and into the lower pond, when the overflow is unable to carry it all away. The run at the end of the archway is paved with boulders to a depth of two feet, to prevent the water, which at this point flows with great force, from washing away the foundation of the overflow which is just to the right above.

The archway itself is fifty-six feet in length, and is supported by buttresses built to the sides of the blasted ledge. Over these are built the three stages of stairs leading from the roadway along the lower berme of the dam to the gate-house. The overflow is at the extreme right of the dam looking down-stream, and is built on the ledge, the rock forming part of the carry to the lower pond as far as it extends. The opening in the overflow wall is forty feet wide, but the run just below it is sixty feet in width. The walls which form its sides are five feet high just above the point where the water empties into the lower pond, and gradually rise until at the top of the overflow it is level with the top of the dam. Across the overflow opening in the wall is built an iron arch bridge, having the full span of forty feet and a rise of three feet above the top of the abutment. It will be planked with two-inch hard pine. The end of the overflow nearly reaches Summer Street, and for additional strength a return wall is built just back of it. There is also a wing dam extending a short distance along Summer Street, where the water in the basin will be a little higher than the level of the street. Along Summer Street there is a granite dike built of the same stone as is used for the gate-house and its chambers and the overflow. The dam thus far described was the contract undertaken by Messrs. H. H. Pike & Son.

Topography and Capacity of Stony Brook Basin.

The natural advantages of the Stony Brook Basin are such that scarcely any work will be necessary to make the basin suitable for the storage of water. After the mud was changed from the bed of the pond, a hard and clean bottom was left, it being composed of hard blue gravel and boulder clay. The sloping banks of the basin were covered with a heavy growth of trees, and to make ready to raise the water twenty feet in height it was necessary to clear some of these away. Beyond this, comparatively little work has had to be done. The valley between Sibley's dam and Roberts dam is comparatively level, and this though halfway between the two there was another dam which it was necessary to cut away. Just above Sibley's dam, however, at Stony Brook station, below his mill pond, the stream, in a distance of 300 or 400 feet, turns almost a half-circle and falls about 26 feet in that distance. This fall of 26 feet gives ample room for the rise of 20 feet of water over the general surface of the pond. The length of the basin from the dam to the 26-foot falls is 1½ miles, but so changeable are its banks that it is almost impossible to estimate the length of water front. From the upper point of the basin to a point about one-third of the distance between Stony Brook station and Roberts crossing station the stream winds round in an almost exact half-circle, and then in a quarter-circle turns back toward the South Street bridge. It covers an area of 75 acres, and will contain about 360,000,000 gallons of water. The greatest flow in one day ever known was during the freshet of February, 1886, when about 700,000,000 gallons of water flowed through the sluiceway. It is possible to estimate the average daily flow of the brook during the year, as a record has been kept, and it will probably average 20,000,000 gallons per day. The basin, when filled, will make a beautiful sheet of water.

The quality of water found in the Stony Brook basin is called very good. It is much softer than Fresh Pond water and it is expected the mixture will be much more desirable for domestic use. The Stony Brook water also has a color which it is said will disappear before it reaches the Cambridge reservoir.

Between the Stony Brook dam and Fresh Pond there are nine gates, besides two at the gate-house. These gates along the way are principally for the protection against accident of people living in the vicinity of the pipe. There are two gates between the Waltham pumping station and the foot-bridge, that is, one on each side of the Waltham Cemetery, so as to shut off the water in the cemetery in case of accident.

The Abutters.

There are eight abutters whose estates bordered on the mill pond, and to whom land damages must be paid. They are William Roberts, John Roberts' heirs, Mrs. Millar, Fitchburg Railroad Company, N. L. Sibley, Mr. Keefe, Mrs. Ellis, Mr. McCann and the Loring heirs. The city has estimated the value of the land in general at $200 per acre, while the assessors' valuation of many plots has been about $50. It is said, however, that some of the owners have sworn that the value of their land is

$1,000 per acre. By far the largest amount of money will have to be paid to the Roberts heirs and to Mr. N. L. Sibley, as, beside the land damages, both of these estates will claim a considerable amount of money for loss of water power.

When Cambridge people stop to think how near the present locality of the dam came to being the site of the Waltham Watch Company's works, and as a consequence the site of the city of Waltham, they may consider themselves fortunate indeed that they are enabled to obtain their additional supply so near home. It appears that Mr. Sibley, who owns the greater part of the land bordering on the brook, was, at one time, about twenty years ago, offered a good price for a portion of his property by the watch company. He agreed to sell it, but, before the papers were drawn, backed down and set a higher price. The company came up to his figures again, but Mr. Sibley advanced again in the same way as at first, and then charged so much more than the property was worth, the company sought another location. It has well been said that Mr. Sibley could have afforded to give what the watch company wanted free, as it would have brought the remainder of his vast estate into the market right away. But what was Sibley's loss was Cambridge's gain.

The Engineering.

The work of building the dam and preparing the basin for the city's use has been primarily in charge of City Engineer, W. S. Barbour. Directly under him has been Mr. George Davis, who has by reason of his position as resident engineer had rather more to do with the work of construction than any one else. Mr. Davis has had the constant engineering assistance of Mr. B. F. Bates from the outset until the present time, while at different times and temporarily Mr. J. H. Stubbs has also assisted in the engineering work in a very satisfactory manner.

Messrs. Davis and Bates have boarded with families in the vicinity of their work during the two and a half years they have been employed on the job. The engineer's office at Stony Brook has been located in a building very near the South Street bridge. Altogether they have been quite comfortable quarters.

City Engineer Barbour has had the able assistance of Mr. N. Henry Crafts as consulting engineer, while Mr. George F. Greenlaw has acted as inspector for the city.

Mr. L. M. Hastings of the city engineer's office has had charge of the designing of the plans for the construction of the entire work at Stony Brook, the details of which have constituted no small job.

It took about ten months to lay the seven miles of piping between the dam and Fresh Pond. "Specials" have also been laid where the pipes pass near the Waltham water department's water main, and connection with the two systems can be made as soon as the latter city is ready to bear its share of the expense and lay the necessary pipes.

The Stony Brook Inlet to Fresh Pond.

The water pipe from Stony Brook enters Fresh Pond at the South Nook. The pipe rises perpendicularly with the bed of the pond 100 feet from the shore. Its top is about on a level with the high-water mark of the pond. An experiment is to be tried, and will probably be in readiness today, of aërating the water as it enters Fresh Pond. On the top of the inlet pipe is to be placed a cap with a central opening of six inches. Around this opening will be a row of openings, each two inches in diameter, outside of that another row of openings, one and a half inches in diameter, and outside of those a third row, one inch. By this means a fountain will be formed, and the water, as it is thrown into the air, will be broken and aërated before mixing with the Fresh Pond supply. Into the openings in the cap will be fitted small nozzles to direct the streams. The cap is intended to be used only in summer, when it will serve the double purpose of purifying the water and form another attraction for visitors to the pond. It is calculated a stream can be thrown twenty-five feet into the air. The credit of this improvement is due to Superintendent Hiram Nevons of the water works and Engineer E. C. Brooks of the pumping station, who conceived the idea only recently, and which the water board was as late as last Monday in adopting, thereby making necessary the transplanting of the inlet pipe and its surrounding stone cone from their original positions. It also required various castings to be made and a vast amount of other work. The completion of the job is assured by today, so that the visitors will without doubt have an opportunity of witnessing the operation of the experiment.

The Stony Brook Gate-House.

The gate-house at Stony Brook, as before stated, rests upon a solid bed of granite with the gate chambers imbedded in the granite ledge. The chambers were built by the contractors who built the dam. The house was erected by M. N. Stearns of this city. It is an attractive building, one story high, thirty-one feet front and twenty-five feet wide, facing to the south. It is built of face brick, with granite base, and trimmings of yellow New Brunswick freestone. The roof is surmounted by a cupola and vane. Over the front entrance is a brick porch. The building is not yet quite finished.

Comparative Elevations.

The elevation figures shown on the section view of the core wall represent the height above the city base. Stony Brook high-water mark is 81, that is, 81 feet above the city base. Fresh Pond high-water is 16.85 feet above city base, making the fall between the former and the latter 64.15 feet. Stony Brook is within 10 feet as high as the high-water mark in Cambridge reservoir.

Facts about the Cambridge Pumping Apparatus.

The water in Fresh Pond Friday was at a grade 3.38. Five and one-half feet more of water is necessary to be able to do the pumping direct from the main pumping station, and to do away with the auxiliary pump. If the Stony Brook supply should flow continuously and at its best, it would raise the pond about two and a half feet in one month. It would therefore take about two months to raise it to the necessary height to dispense with the auxiliary pump. The water from Stony Brook after today will doubtless be permitted to flow steadily into Fresh Pond. Providing it does flow steadily and at its full capacity, the auxiliary pumps cannot be abandoned until January 1, anyway. It is very desirable that the City's supply shall not be dependent on the auxiliary pumps any longer than absolutely necessary.

The pumps at the auxiliary station comprise a twelve-inch centrifugal pump and a twelve-inch Follansbee pump. Each is capable of supplying six million gallons a day. In the main pumping station are also two pumps, capable of putting five million gallons a day into the reservoir. There is, besides, a high service pump with a capacity of one million gallons a day. The capacity of the reservoir is about six million gallons.

The Condition of Fresh Pond.

The water in Fresh Pond, the present supply of Cambridge, is today at grade 3.38, the lowest it was ever known to be. Notable low-water marks in years past are as follows: November 24, 1870, 12.44 grade; February 23, 1875, 8.97 grade; February 7, 1881, 7.75 grade; January 1, 1884, 5.54 grade. High-water mark is 16.85 grade.

The Tribune's Illustrations.

The views of the dam, basin and pumping station published in today's *Tribune* were reproduced by the Boston Engraving Company, from photographs by Mr. D. W. Butterfield. The cut of the gate-house is from a perspective drawn by Mr. Harry Adams of the City Engineer's office, while the diagram views of the gate-house chambers and section of the core wall and dam were made especially for us by Resident Engineer George Davis.

Programme of Today's Exercises.

The programme of today's celebration in general is as follows: The Cambridge guests will leave the City Hall at 9 A. M. in Cambridge Railroad barges, and will be driven to the Fresh Pond pumping station. Here a tablet, described elsewhere, will be unveiled, and a few remarks made by President C. W. Kingsley. The party will then proceed to the south cove of the pond, where the Stony Brook inlet is located, and the water from the latter will be turned into the pond. A special train will then be taken from Fresh Pond to Roberts crossing, Stony Brook. Arriving at Roberts, the party will alight and take barges for the dam, half a mile away. The work there will be inspected and described. The barge will then be taken again for a drive to Woodland Park Hotel, Auburndale, where a dinner is to be held. Ex-Mayor Hall will preside. After dinner remarks will be made by President Kingsley, Mayor Russell, Mayor Fisher of Waltham, members of the boards of aldermen and common council, City Engineer Barbour and others.

The visitors from Waltham and Watertown will join the party at the City Hall in season to start in the barges. The Lincoln and Weston guests will meet the party at Roberts crossing. If today should be stormy the celebration will be postponed until next Saturday.

City Messenger Francis L. Pratt will be in charge of today's arrangements, which is a sufficient guarantee that everything will pass off smoothly and that everybody will be happy.

The Tablet.

Following is the inscription on the tablet which is to be unveiled at the Fresh Pond pumping station. It is located over the rear door on the north-east end as seen in our view of the interior of the pumping station. This tablet is of Italian marble, an inch and a half thick, 14 feet 6 inches long, and 5 feet 4 inches wide, with a round top. The letters of the inscription are painted in red. Above the inscription is engraved a spray of laurel gilded. The tablet was cut by Mr. John McNamee at the Union Marble Works, Mt. Auburn. The inscription upon it reads as follows:

CAMBRIDGE WATER WORKS.
Chartered May 20, 1852,
To Take Water from Fresh Pond.

Incorporators:
Estes Howe, Gardiner G. Hubbard, Moses M. Rice.
Organized May 31, 1853. Ground broken July 21, 1855.
John H. Blake, Engineer; Gardiner Warren, Contractor.
Purchased by the City of Cambridge, April 28, 1865. J. Warren Merrill, Mayor.
Wellington Brook. Additional Supply.
Act obtained May 1, 1875. J. G. Chase, Engineer.
Stony Brook. Further Supply.
Act obtained May 21, 1884. James A. Fox, Mayor. Ground broken January 13, 1885.
Completed November 3, 1887. William E. Russell, Mayor.

Water Board 1885–1887:
Chester W. Kingsley, President.
James M. W. Hall Knowlton S. Chaffee,
Leander M. Hannum, John F. O'Brien,
William E. Russell, Mayor, *ex officio*,
John H. Corcoran, President of the Common Council, *ex officio*.
Superintendent, Hiram Nevons.
Clerk and Registrar, Walter H. Harding.

On Construction of the Stony Brook Supply:
Chief Engineer, William S. Barbour.
Consulting Engineer, N. Henry Crafts.
Assistant Engineer, Lewis M. Hastings.
Resident Engineer, George Davis.

Contractors for Dam and Basin at Stony Brook,
Henry H. Pike & Son.

Pipe Laying, Driveway and Improvements at Fresh Pond done under charge of
Hiram Nevons, Superintendent.

Presidents:
J. Warren Merrill 1865 to 1867,
Ezra Parmenter 1867,
John Sargent 1867 to 1871,
J. Warren Merrill 1871 to 1873,
Chester W. Kingsley 1873 to 1876
George P. Carter 1876 to 1883,
Chester W. Kingsley 1883 to ——

Superintendents:
George W. Fifield 1865 to 1867,
W. H. Pratt 1867 to 1869,
Samuel W. Dudley 1870 to 1877,
Hiram Nevons 1877 to ——

Pumping Engineers:
Thomas G. Bruce 1865 to 1870,
Edwin C. Brooks 1870 to ——
C. G. H. Bennink, President Common Council 1884.

The Dinner at Auburndale.

The following menu has been prepared for the dinner to be given after the visit to the works:

SOUP.
Bisque of Clam. Julienne,
FISH.
Fillet of Haddock *à la* Rarebit.
REMOVES.
Hot Boned Turkey, with Mushrooms.
Boiled South Down Mutton, Caper Sauce.
Roast Ribs of Beef. Roast Spring Lamb.
Roman Punch.
SIDE DISHES.
Breaded Chops, Tomato Sauce.
Macaroni *au Gratin.*
Escaloped Tomatoes.
Chicken Croquettes. French Peas.
Potatoes. Celery.
SWEETS.
Charlotte Russe. Frozen Pudding. Lemon Sherbet.
Vanilla. Chocolate. Strawberry. Caramel.
Ice Cream.
Crackers. Cheese. Coffee.
Fruit.

The menu will be printed on two sheets of heavy card board, tied together with ribbon. The following inscription will occupy the first page of the card: "Dinner given by the City of Cambridge, in celebration of the completion of the Stony Brook water supply, at Woodland Park Hotel, Auburndale, on Saturday, November 5, 1887."

On the back will be the following: "Committee of arrangements.— Of the Water Board, Hon. James M. W. Hall, Hon. Leander M. Hannum, John F. O'Brien, Esq.; of the City Council, Aldermen Joseph J. Kelley, William E. Hutchins, Councilmen Frank H. Teele, James McDonnell, William S. Shannon."

Today's Invited Guests.

The following are the names of guests who have been invited to participate in the celebration today:

CITY COUNCIL.

Mayor William E. Russell, Aldermen Edward R. Cogswell, Edward W. Hincks, P. Allen Lindsay, Fred. H. Holton, Joseph J. Kelley, John W. Coveney, Joseph A. Ball, Daniel E. Frasier, William E. Hutchins, Charles F. Stratton, John H. Corcoran, president; Councilmen William H. Eveleth, Warren Ivers, James McDonnell, Alexander Millan, Oliver H. Durrell, Thomas Houllahan, James McPeck, Alvin F. Sortwell, Frank H. Teele, Patrick J. Callahan, Patrick H. DeCourcy, Francis

Fitzpatrick, William S. Shannon, Edward A. Bingham, Franklin W. Haynes, Charles Waugh, Chester F. Sanger, James E. Tracy.

WATER BOARD.

Chester W. Kingsley, Leander M. Hannum, John F. O'Brien, Knowlton S. Chaffee, James M. W. Hall.

EX-MAYORS.

George Stevens, Charles T. Russell, J. Warren Merrill, Charles H. Saunders, Hamlin R. Harding, Henry O. Houghton, Isaac Bradford, Frank A. Allen, Samuel L. Montague, James A. Fox.

EX-PRESIDENTS COMMON COUNCIL.

John C. Dodge, George S. Saunders, John S. March, Marshall T. Bigelow, Joseph H. Converse, George F. Piper, Perez G. Porter, Charles Walker, George H. Howard, Francis H. Whitman.

HEADS OF DEPARTMENTS.

Walter W. Pike, city clerk; Edward J. Brandon, assistant city clerk; John McDuffie, clerk of committees; Francis L. Pratt, city messenger; William W. Dallinger, city treasurer; Harry T. Upham, city auditor; Charles J. McIntire, city solicitor; Benjamin H. Steele, superintendent public buildings; William S. Barbour, city engineer; Lothrop J. Cloyes, chief of police; Thomas J. Casey, chief of fire department; John McSorley, superintendent of streets; Joshua G. Gooch, Joseph Whittemore, Andrew J. Green, principal assessors; B. Otis Danforth, superintendent of lamps; William J. Marvin, bridge commissioner; Francis Cogswell, superintendent of schools; Martin L. Eldridge, warden of almshouse; Charles S. Childs, superintendent of cemetery; Hiram Nevons, superintendent of water works; John L. Harrington, assistant superintendent of water works; Walter H. Harding, water registrar; Henry P. Walcott, city physician; Alfred F. Holt, health officer; Lewis L. Bryant, assistant city physician; Edwin C. Brooks, pumping engineer; Leander Greely, commissioner of Harvard Bridge; N. Henry Crafts, engineer; David P. Muzzey, secretary of the board of overseers of the poor; Charles E. Whitin; Rev. Francis G. Peabody, D. D.

MEMBERS OF LEGISLATURE OF 1884.

William A. Bancroft, George D. Chamberlain, Lewis W. Howes, George C. Bent, Jeremiah W. Coveney, Senator Henry H. Gilmore.

MEMBERS OF LEGISLATURE OF 1887.

Solomon S. Sleeper, George A. Perkins, C. G. H. Bennink, John T. Scully, Charles W. Henderson, Isaac S. Pear, Horace G. Kemp, Senator Alpheus B. Alger.

PUBLISHERS CAMBRIDGE NEWSPAPERS.

William B. Howland, *Tribune;* F. Stanhope Hill, *Chronicle;* James Cox, *Press;* D. A. Buckley, *News.*

REPRESENTATIVES OF THE BOSTON PRESS.

C. O. T. Stevens, Boston *Herald;* John W. Kelly, Boston *Globe;* F. J. Caulkins, Boston *Advertiser;* C. B. Seagrave, Boston *Journal.*

WALTHAM CITY COUNCIL.

Mayor Hon. Henry N. Fisher, Aldermen Charles P. Bond, Ralph S. Wentworth, John J. Harvey, John Handrahan, John E. Soper, Elias B. Armstrong, George B. Moore, George S. Alden, Henry A. Caswell, John J. Fahay, Horatio N. Allen, Mahlon R. Leonard, Milton H. Stevens, Hiram Weeks, Samuel Green, Charles H. Moulton, Henry Bond, Charles W. Durgin, Murray D. Clement, Samuel E. Clark, William C. Hayes, Thomas E. Harvey.

WESTON SELECTMEN.

Henry J. White, Samuel H. Warren, Arthur L. Coburn.

WATERTOWN SELECTMEN.

Charles Brigham, Edward F. Porter, Hiram D. Skinner.

LINCOLN SELECTMEN.

Samuel Hartwell, Edward C. Foster, George F. Harrington.

STONY BROOK.

The Water Works Celebration Last Saturday—A Pleasant Day, a Good Dinner and some Lively Speeches.

The celebration of the completion of Stony Brook water supply, last Saturday, passed off as successfully and pleasantly to the limited number engaged in it as any one of them had anticipated. The day was a fine autumn specimen, a trifle cold for barge-riding, but exhilarating and on the whole not unsuited to the occasion. The guests of the day numbered nearly one hundred. Five barges and a stage-coach conveyed the party from the City Hall to Fresh Pond soon after nine o'clock. After a brief stop at the pumping station to take on a Waltham delegation, the procession passed up Concord Avenue to the upper entrance to that drive. They drove around the north and west side of the pond to the south cove, where all alighted to witness the turning on of the water from the Stony Brook inlet. With a simple, "This is the day we long have sought, and mourned because we saw it not," by President Kingsley, the water was sent through the pipe into the shallow basin, and in time flowed to meet the low water in the pond. The fountain-like contrivance on the end of the pipe which was alluded to last week, worked to a charm, and made the inflow of water, which otherwise would have been a tame affair, a sight worth seeing. A foaming stream, fully twenty-five feet, was thrown into the air. Considerable sport was created by the scramble of the ever-present small boys for a number of eels which were emitted through the pipe. Owing to the shallow water it was possible to catch them, but it took a pretty smart boy to do it or to hold them after they were caught.

After the turning on of the water, barges were again taken for the pumping station, where a lunch of sandwiches and coffee was served. After the lunch, the marble tablet, before described, was unveiled by President Kingsley, who offered a few brief remarks in that connection. Proceeding next to Fresh Pond depot, near the pumping station, a special train was taken for Robert's crossing, from which the party proceeded mostly afoot to the Stony Brook dam. After a half-hour's inspection, barges were again taken for the Woodland Park Hotel, Auburndale, where an excellent dinner was served. Hon. J. M. W. Hall presided at the post-prandial exercises. The following toasts were given and were eloquently and wittily responded to:

Our beloved city—may her influence ever be for what is pure and healthful in all that concerns the well-being of her citizens—a fountain from which all may drink; responded to by Mayor Russell.

Harvard College—almost a twin sister, she supplies us with pure learning. If in no other way we can express our gratitude, we will by keeping her supplied with pure water, good streets, good lights and a good police force for her students; responded to by Rev. Prof. F. G. Peabody.

Senator C. O. Whitin of Whitinville told of his interest in behalf of Cambridge's water bill and his high regard for Mr. Kingsley.

Our younger sister, the city of Waltham—may the pure and abundant water which she sends us be the symbol of the reciprocal relation which will always be mutually encouraged and maintained; Mayor H. N. Fisher.

Our city government—may our citizens ever be ready to serve the city as faithfully and satisfactorily as the present council; Alderman J. J. Kelley, chairman committee on water supply.

Our Water Board—realizing the fact that "no license" prevails in our city, they are determined to furnish our citizens with a more abundant supply of pure water; responded to by C. W. Kingsley.

Watertown—our guest—a stanch and true friend, the best Watertown we know; we extend the right hand of fellowship on this occasion; responded to by Mr. Porter.

The town of Lincoln—its long history is filled with records of the patriotism and high morality of its citizens. May it ever be as renowned in keeping all contamination from the source of our water supply, as it has been in keeping its children from all evil surroundings.

Weston—may the new and intimate relations which we now sustain, through the Stony Brook supply, flow on like that stream, deeper and better.

The law—it came before the gospel; we obtained first the law of protection to our water interests and then the gospel of a good water supply; responded to by C. J. McIntire, Esq., city solicitor.

The product of the law—the lawyers. Endeavoring to steer between the two, we look to the Superior Court; responded to by Judge Hammond.

Our veterans—they shed their blood like water, but no water was in their blood. It was true blood and true blue; responded to by Gen. E. W. Hincks.

Our Common Council—an uncommonly good one—we say to them for 1888, "Come again;" responded to by President J. H. Corcoran.

Mr. W. S. Barbour, city engineer, was called upon, and made a statement of the scientific principles of the dam.

The water supply committee—may their shadow never be less; responded to by F. H. Teele, Esq., of that committee.

Stony Brook supply—a monument of engineering skill in its construction. May its lines ever be true and strong, and its reserve force ever be equal to our largest demand; responded to by Mr. W. L. Barbour, city engineer.

Mayor Russell's Speech.

Of the many occasions, Mr. Chairman, when it has been my privilege to respond for our good city, whom we all love almost as a mother, I never have done so with more pleasure than today, when she celebrates her gift of another blessing to all her children. She has felt their suffering; she has seen their need; and with fidelity, and energy, and enterprise, well has answered it, "casting her bread upon the waters, where she shall find it — even after many days." Old Fresh Pond, that has been giving to us almost of her life-blood, feels today the impulse of renewed vigor, and knows that in her days of exhaustion and seeming old age, there stand behind her the hills of Weston, from whose gentle slopes the rains of Heaven shall flow to give her unfailing strength and perennial youth. "The springs of the hills have come unto us to refresh us."

We celebrate the completion of a work begun under the pressure of a necessity that no longer could be resisted. Year after year we had anxiously watched our water supply gradually, but surely, diminishing; and we had faced the terrible possibility of its failure. Various expedients had been resorted to; extra pumps had been used to follow the falling waters; and other measures of doubtful success had been adopted. Finally, it became no longer a matter of doubt that the best, cheapest, and most certain remedy was to grapple with the question in a comprehensive way, and settle it, not for one nor for five, but for fifty years. We looked about for "the water brooks the hart panteth after," and after some reverses, found in Stony Brook an abundant, unused supply that would answer our need without encroaching, we believe, on the rights of a neighbor. The health, comfort, and prosperity of sixty thousand people demanded that those waters no longer should run to waste.

The power of the State was invoked, and, after discouraging defeat, our need was appreciated. In 1884 the legislature granted our city the right to gather up the wasting waters, and turn them to the use of man. Soon after the City Council passed the necessary appropriations, and the Water Board commenced the work. For nearly three years, the labor has continued unceasingly, till today we may fairly say it stands accomplished. Abundant pure water is secured for more than a generation, and for more than treble our present population.

And what a grand work it is! Judged as an engineering feat, or by its cost, or by the labor involved, or, best of all, by its use and benefit to meet the present need of all our citizens, and the wants of generations yet unborn — it stands forth conspicuously as one of the greatest works our city has ever undertaken. It insures comfort to the humblest citizen, as well as prosperity to the largest industry. It enters into every household, giving, like rays of sunshine, its blessing everywhere.

While today, sir, we rejoice in the completion of a work so great and lasting in its benefits, it is fitting that, speaking for the city, I should express her thanks and gratitude to those whose labors have contributed to its success: First to all her faithful representatives, whose perseverance and able advocacy convinced a doubting house, snatched victory from defeat, and gave the sanction of the Commonwealth to our enterprise; next to the City Council, that promptly added its sanction, and has cheerfully furnished the means to carry on the work; next to the Water Board, and especially its able, faithful president, who with patience and energy have discharged the heavy burden and responsibility of planning and directing the work in all its details. Nor should we forget the men upon whom the real work has fallen. I offer the thanks of the city to our engineer and his assistants, and to our superintendent for the skill, ability, zeal and good judgment with which they have carried out the plans of the board. And last, but not least, in her name, I thank the hundreds of humble, honest toilers, whose constant, patient labor, whose brawn and muscle have made the project an accomplished fact.

Beyond our city and its citizens, there are other places whose courtesy and assistance we gratefully remember. Against their will, we came into the city of Waltham, and the towns whose presence grace our board today. They fought us bitterly, when we asked the legislative sanction, but fairly, frankly, honorably. There the fight ended. With magnanimity and unselfishness, they have placed no obstacles in our path, but have stood ever ready to make our path clearer, and our task easier. They have proved that town and city lines do not separate men into hostile interests; that kindness and courtesy can easily extend beyond them, and that we are all bound together by mutual desire to help each other, and so help all. Cambridge gladly acknowledges the obligation that she owes, and most earnestly wishes that our pleasant neighborly relations may never be disturbed.

Mr. Chairman, our work shows the power of a great city, the union of all for the benefit of all. Remembering its power, remembering its grand influences that make for good, its churches, its schools, and its charities; how closely it binds us all together in mutual sympathy and suffering in mutual help and rejoicing, I believe it to be true that the life of a great city is the best illustration of the highest civilization of this civilized age. May I wish, in closing that in such things Cambridge may always lead, may never step backward; and this work today finished, may bring to each and all of her citizens renewed health, happiness and prosperity.

President Kingsley's Speech.

For my part of the exercises of today, it seems to me I cannot do better than to put before you some facts about the history of our water works not generally known by our people, but which will be of interest at the present time, and valuable for future reference; I will therefore proceed to give you some facts about the water works:

1st. "The Cambridgeport Aqueduct Company," was chartered April 13, 1837, and "William Fiske, Aaron Rice and John Skinner and their associates" were the incorporators. They were empowered to lay and maintain pipes or aqueducts from the spring or springs of water in land formerly of Jonathan Ireland, at or near Prospect Hill in Charlestown, into and through the town of Cambridge and provision was made for putting in fire plugs for the use of Charlestown and Cambridge, free of expense, for the use of the water for putting out fires, and for the sale of water. The capital authorized was $30,000. These springs were in what is now the city of Somerville, and for some twenty years was all the public water supply in the city of Cambridge; but the city grew and the need for water increased.

2d. May 20, 1852, Estes Howe, Gardiner Green Hubbard and Moses M. Rice and their associates were incorporated under the name of Cambridge water works, for the purpose of "supplying the city of Cambridge with water." They were authorized to have a capital of $500.000 and hold real estate of the value of $100,000. The city of Cambridge was authorized to "purchase the property of the corporation at any time, at a price agreed upon, or as fixed by commissioners appointed by the Supreme Judicial Court." There was no provision in the charter for taking water from any place.

3d. May 11, 1853, the city of Cambridge was authorized to subscribe for any portion of the stock of the Cambridge Water Works, or to loan money to the company on pledge of their stock. Nothing seems to have been done by the company except preliminary work, until 1856, when we find,

4th. "An act concerning the Cambridge Water Works" was passed and approved June 6, 1856, authorizing the company to take the waters of Fresh Pond for the purpose of supplying the inhabitants of Cambridge with soft water, and by erecting dams at the outlet of Little and Spy Ponds, turn the surplus overflow from these sources into Fresh Pond. They were authorized to dig up the streets, lay pipes, and do all other things necessary to distribute the water through Cambridge. The act was to take effect upon the approval of a majority of the legal voters of the city of Cambridge at a meeting to be called for that purpose. The meeting was called and the act approved Nov. 4th, 1886, by a vote of 791 to 20 and soon after work was commenced by the company by building a reservoir, placing steam-pumps on the border of the pond, and completing the connection between them, and supplying the people from the reservoir as fast as the pipes were laid, and thus was practically begun the work on the present Cambridge water works.

5th. By an act approved Jan. 31, 1861, the Cambridge Water Works were authorized to purchase the Cambridge Aqueduct Company and all its corporate property, rights and privileges This was done and then,

6th. An act was passed by the legislature and approved April 25, 1865, authorizing the city of Cambridge to purchase all the works, franchises, rights and property of the Cambridge Water Works, including the Cambridgeport Aqueduct Company, and thereafter to construct all the necessary works to carry into effect the purpose of supplying the inhabitants of Cambridge with Fresh Pond water. The purchase was made after submitting the matter to a vote of the people. The price paid was

$291,400, and this price did not pay the stockholders of the company back the amount they expended on the works. The company did not have the necessary means to prosecute the work to a successful issue, and were glad to turn it over to the city at that price. There was a great deal of discussion among our citizens about whether it was wise for the city to make this purchase, and assume the necessary expense to satisfactorily complete the works and properly supply the inhabitants with water. Some thought it would be a place where jobs would be put up to defraud the city, others thought it would be made a political football, while others still thought it would run the city in debt, and prove to be for the city what it had been for the stockholders of the company, an unprofitable investment. For this reason, it was provided that after purchase a separate account should be kept of the water works, so that all might know the result; this result will be found later on in the statement of our financial condition. From this time the work was vigorously pushed, and to meet the necessary expenses, about $500,000 authorized at the time of the purchase, we find it was limited to six per cent interest and not to be sold below par. Money was scarce, so,

7th. An act approved March 21, 1866, authorized the city council to sell the scrip and bonds of the city, or pledge them for money borrowed, on such terms as the city council may deem proper. This loan having been nearly exhausted we find,

8th, By an act of the legislature, approved February 17, 1868, the city was authorized to issue an additional amount of bonds, not exceeding $500,000, bearing interest not exceeding six per cent, on time not exceeding fifty years, to be disposed of on such terms as the city council may deem proper.

9th. By an act of the legislature, approved March 28, 1872, the city was authorized to issue an additional amount of bonds, not exceeding $500,000, on the same terms as the last issue authorized.

10th. By an act of the legislature, approved April 20, 1875, the city was authorized to issue an additional $500,000 of bonds on the same terms.

11th. By an act approved May 1, 1875, the city was authorized to take the waters of Spy and Little Ponds and Wellington Brook for an additional water supply, and also to take and hold by purchase or otherwise such land on and around the margin of Fresh Pond, not exceeding five rods in width, as may be necessary to preserve the purity of the water in the pond, and the same power in regard to Spy and Little Ponds. Several takings under this act have been made around Fresh Pond, but the water of Spy Pond having been condemned by a commission of experts appointed by the city council, no water from that source has been used. The owners of land around Spy Pond complained that our right to take five rods was an encumbrance on their land. Without opposition from us it was provided,

12th. By act approved April 7, 1880, that our right to take a strip around Spy Pond should be revoked. A connection was made with Wellington Brook and a filter basin on the border of Little Pond, nd water taken from these sources into Fresh Pond when the ground was frozen, and the melted snow water was running. It is upon this source of supply that we have relied for the past ten years to replenish our pond in the springtime, and eke out our scanty supply from the pond itself. It having become evident that this water supply was becoming altogether inadequate, application was made in 1881, 1882 and 1883 for the right to procure water from Shawsheen River. All these petitions were denied to us, and in the year 1884 a petition was made to the legislature for the right to take the water of Stony Brook. After a long and persistent contest it was granted,

13th. By an act of the legislature approved May 21, 1884, in which the city of Cambridge was authorized to take the waters of Stony Brook and the tributaries thereof, for the purpose of extinguishing fires and for domestic and other purposes, and convey the same by way of Fresh Pond or otherwise to the city of Cambridge. With this act, all the powers necessary were granted for purchasing or taking lands, for laying pipes, constructing reservoirs, storage basins, dams and other works that may be necessary or proper for collecting, purifying, storing, conducting and distributing the waters thereof. This act of the legislature was accepted by the City Council, and in July, 1884, the City Council made an appropriation to enable the Water Board to proceed with the work of laying the pipes to connect Stony Brook with Fresh Pond. Surveys and soundings for the dam at Stony Brook and the storage basin were made and a contract made for the iron pipe and special castings that were needed. The work of laying the pipe was commenced at Fresh Pond in February, 1885, and was prosecuted with vigor under our superintendent until completed. Only one section of about two miles was done by contract. The rest, of nearly six miles, was done by the day, the work being done by Cambridge men.

The contract for building the dam and storage basin at Stony Brook was awarded in the spring of 1885. Our first contractors backed out and left the work. The work was contracted a second time, and work commenced by Messrs. Henry H. Pike & Son in September of that year, and their work was not completed until October of the present year. It has been a long and somewhat more expensive job than we anticipated at the first. We estimated that the cost complete would be $500,000, and just about that amount has been expended up to this time. A very considerable sum has been expended around the borders of Fresh Pond, in grading and riprapping the shores of the pond to make it a proper reservoir to receive and hold our water from Stony Brook. The result of our work in that direction you have all seen today. We have yet to hear anything but praise and commendation from any of our citizens, in reference to the work done around Fresh Pond.

So far as our water supply is concerned, the work is now substantially completed. You have today seen the water let on, and we trust that fountain will not cease to flow until our beautiful reservoir is once more filled up to the brim, an event which has not occurred for more than ten years past. I have thus endeavored to give you a brief and concise history of the Cambridge Water Works to the present time, touching only the salient points in its development. To go more into detail would weary you, as you may well know, when I state that I have in bound volumes in my library more than 4,000 pages of printed matter about our Water Works.

There now remains for me only to give you a brief statement of our financial history. As the accounts for this year are not made up, I will take the statement made November 30, 1886, as a basis, and add to this, estimates which will not be very far from correct.

Total cost of the works Nov. 30, 1886		$2,294,043 39
Estimated amount yet to be added		405,956 61
Estimated total cost, completed		$2,700,000 00
Amount of this paid in bonds by the sinking fund to Nov. 30, 1886, as per treasurer's report	$391,400 00	
Value of sinking fund Nov. 30, 1886, per commissioner's report	892,005 97	
		1,283,405 97
Estimated cost of the water works, net		$1,416,594 03

In this estimate has been added the work to be done around Fresh Pond, from time to time. We think it can be demonstrated, if the same management of the Water Works is continued for the next twenty years, that all needed additions and improvements can be made and paid for, and at the same time all outstanding bonds paid, and at the end of that time the city will own its Water Works paid for, and with an annual income therefrom, after furnishing her citizens with water at the lowest current rates, of not less than $250,000.

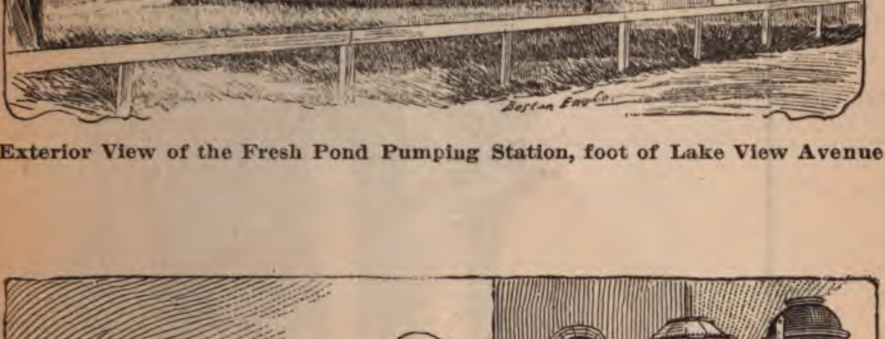
In all our work we have had the hearty coöperation of the City Council, who have only needed to see the importance of what the Water Board recommended, when they cheerfully made the necessary appropriations to carry it out.

Boston Eng. Co.

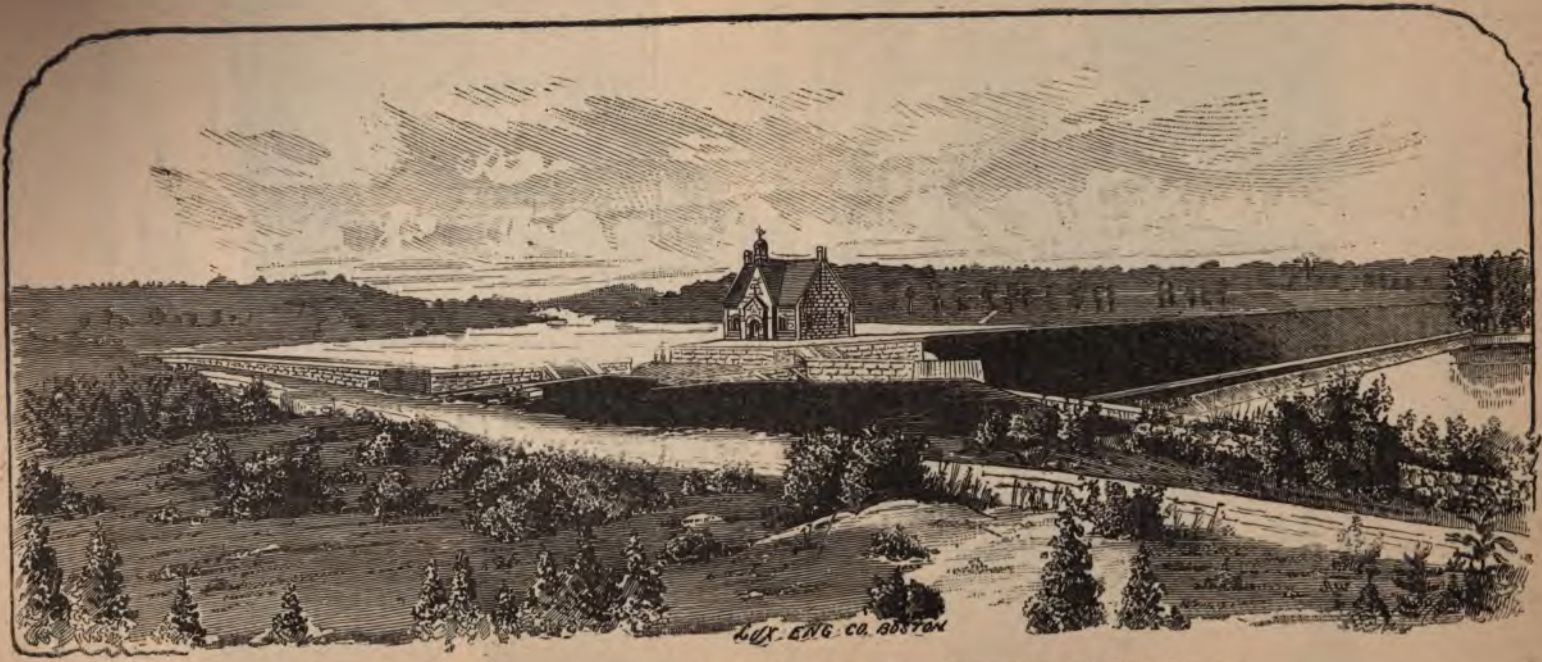
Chester W. Kingsley, President of the Cambridge Water Board and member of the Water Board since 1865, when the City bought the Water Works, and the Board was organized.

Boston Eng Co.

Exterior View of the Fresh Pond Pumping Station, foot of Lake View Avenue


Boston Eng Co.

Interior of Pumping Station at Fresh Pond, showing Tablet



General View of Stony Brook Basin, showing the Dam, Abutments and Gate House.

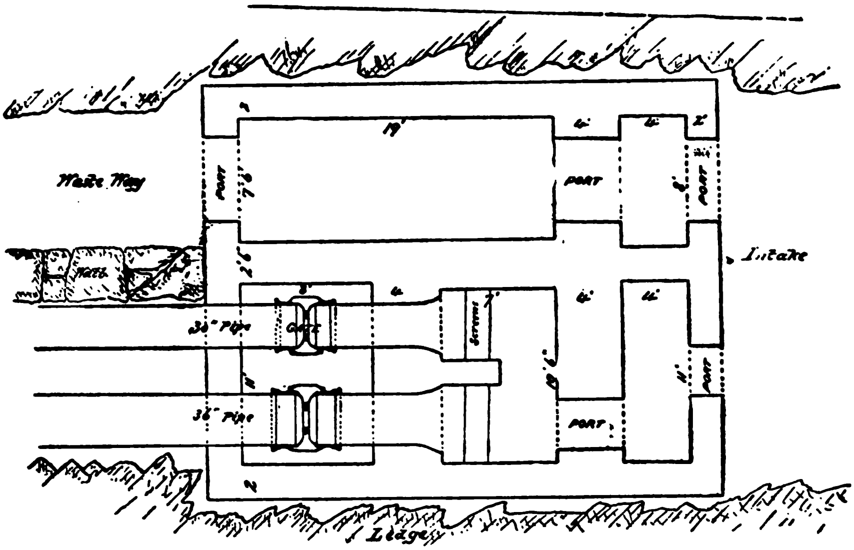
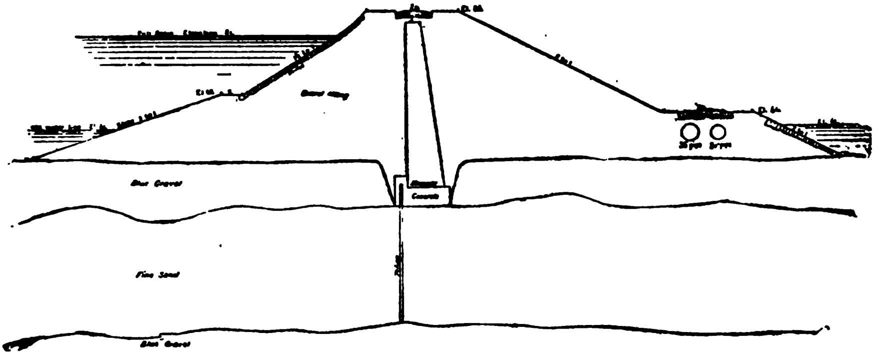
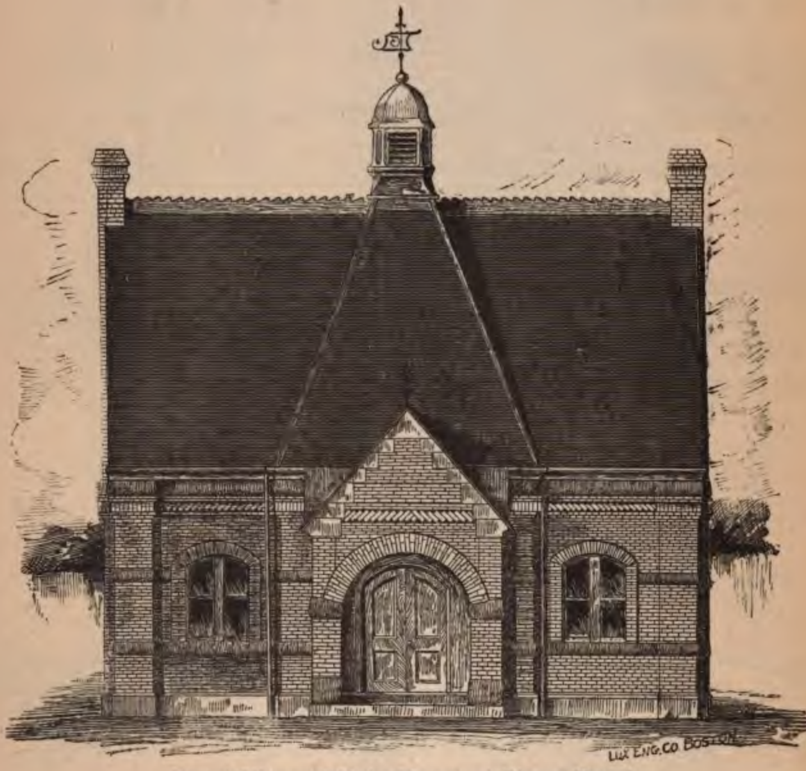


Diagram of the Chambers of the Gate House.



A Sectional View of the Stony Brook Dam and Core Wall.


LUX ENG. CO. BOSTON.

Front View of Gate House at Stony Brook.

REPORT

OF THE

WATER REGISTRAR.

WATER REGISTRAR'S OFFICE,
CAMBRIDGE, Dec. 10, 1887.

To the Cambridge Water Board:—

IN compliance with the requirements of the City Ordinance, I present the twenty-third annual report of the operations of this department, showing the receipts, expenditures and abatements, together with a statement of the number of water takers, fixtures, etc., for the year ending Nov. 30, 1887.

Amount of bills remaining unpaid Nov. 30, 1886:—

Water Rates	$65 90	
Meter Rates	258 20	
Supplies and Repairs	1,380 78	

Amount of bills placed in hands of City Treasurer for collection from Nov. 30, 1886, to Nov. 30, 1887:—

Water Rates	$166,734 07	
Meter-rates	44,423 05	
Supplies and repairs	5,632 04	
Off and on water, rent, seals and fines	486 50	
Total bills		$218,980 54

There have been collected:—

Water-rates	$206,538 46	
Off and on water, rent, seals and fines	456 50	
Supplies and repairs	6,138 99	
Total collections	$213,133 95	
Amounts carried forward	$213,133 95	$218,980 54

Amounts brought forward		$213,133 95	$218,980 54
There have been abated:—			
Water-rates		$4,305 86	
Supplies and repairs		16 10	
There remain unpaid:—			
Water-rates	$262 30		
Meter-rates	374 60		
Supplies and repairs	857 73		
Rent	30 00		
		$1,524 63	
			$218,980 54

Expenditures.

Construction account (Stony Brook)		$111,363 26	
Construction account (Fresh Pond land purchase)		11,526 00	
Construction account (general)		19,563 85	
Maintenance account, viz:—			
Care and repairs	$16,645 03		
Pumping service	13,138 93		
New pumping service	4,694 26		
Office expenses	3,132 40		
		$37,610 62	
Supply and repair account		4,714 05	
Total			$184,777 78

Abatements.

Water-rate bills to the amount of	$4,305 86	
Supply and repair bills to the amount of	16 10	
Total		$4,321 96

Refunds.

Water-rates to the amount of	$1,789 82	
Which amount deducted from receipts	206,538 46	
Leaves net receipts for water	$204,748 64	
Add off and on water, rent, seals and fines,	456 50	
Makes net receipts of rates, fines, etc.		$205,205 14

Off and On.

Water has been shut off for non-payment of rates, or per order on account of vacancy, and seals have been applied to fixtures by request of owners or occupants as follows:—

Supplies shut off in 1887	422
Supplies let on, shut off in 1887	300
Supplies let on, shut off in previous years	61
New supplies let on	345
Seal-locks applied to fixtures in 1887	389
Seal-locks removed, put on in 1887	178
Seal-locks removed, put on in previous years	134

Statement of the yearly revenue received [from water-rates since the purchase of the Works by the city:—

From	April	28, 1865,	to	Dec. 1, 1865	$32,367	19
"	Dec.	1, 1865,	"	1, 1866	40,073	27
"	"	1, 1866,	"	1, 1867	52,733	62
"	"	1, 1867,	"	1, 1868	63,747	42
"	"	1, 1868,	"	1, 1869	76,149	30
"	"	1, 1869,	"	1, 1870	92,606	95
"	"	1, 1870,	"	1, 1871	111,782	65
"	"	1, 1871,	"	1, 1872	127,201	30
"	"	1, 1872,	"	1, 1873	146,117	32
"	"	1, 1873,	"	1, 1874	153,634	27
"	"	1, 1874,	"	1, 1875	138,880	37
"	"	1, 1875,	"	1, 1876	179,166	76
"	"	1, 1876,	"	1, 1877	154,843	59
"	"	1, 1877,	"	1, 1878	157,443	91
"	"	1, 1878,	"	1, 1879	164,681	90
"	"	1, 1879,	"	1, 1880	173,325	49
"	"	1, 1880,	"	1, 1881	170,062	73
"	"	1, 1881,	"	1, 1882	177,430	80
"	"	1, 1882,	"	1, 1883	179,361	89
"	"	1, 1883,	"	1, 1884 (10 months)	161,526	27
"	"	1, 1884,	"	1, 1885	185,544	36
"	"	1, 1885,	"	1, 1886	199,404	43
"	"	1, 1886,	"	1, 1887	204,748	64

By request of the City Council, the charges for water for fire hydrants, school houses, public buildings, etc., amounting to $10,000.00, were abated for 1887, and the comparatively small gain in receipts in 1887 over the preceding year is due to the loss of the receipts from these sources.

Comparative Statement.

	1886.		1887.	
Construction Acc't (Stony Brook).				
RECEIVED.				
From bonds issued (par value)	$125,000 00		$95,000 00	
From premium on bonds	322 50		812 50	
Sale of wood at Roberts basin	78 75			
Sale of tickets. Boston and Roberts			42 00	
Allowance made by R. D. Wood & Co. for cracked and light pipe			287 22	
Balance of Appropriation	15,443 63	$140,844 88	1 ,192 46	$114,334 18
EXPENDED.				
Sundry bills	$122,652 42		$111,363 26	
Balance of bonds issued	18,192 46	$140,844 88	2,970 92	$114,334 18
Construction Acc't (Fresh Pond Land Purchase).				
RECEIVED.				
From bonds issued (par value)	$90,000 00			
Sale of old material	2,750 00			
Balance of appropriation from 1886			$28,020 20	
From premium on bonds		$92,750 00	112 50	$28,132 70
EXPENDED.				
Purchase of sundry estates, examination of titles, etc	$64,729 80		$11,526 00	
Balance of appropriation	28,020 20	$92,750 00	16,606 70	$28,132 70
Construction Acc't (General).				
RECEIVED.				
From bonds issued (par value)	$18,000 00			
From premium on bonds	232 20			
Refund of overcharge	1 50		$7 50	
From excess of receipts from rates, fines, etc	1,048 98	$19,282 68	19,556 35	$19,563 85
EXPENDED.				
Sundry bills		$19,282 68		$19,563 85
Maintenance Account.				
RECEIVED.				
Accrued interest on Water Bonds	$135 90		$172 22	
Sale of horse			100 00	
American Rubber Co			751 69	
Rates, fines, etc	199,829 33	$199,965 23	205,205 14	
Duplication of names on pay-roll—amount covered back into treasury			9 50	$206,238 55
EXPENDED.				
Care and repairs	$29,858 33		$37,610 62	
Interest on Water Debt	99,015 00		97.355 00	
Paid to Sinking Fund Commisoners	57,675 00	$186,548 33	51,465 00	$186,430 62
Excess of receipts		$13,416 90		$19,807 93
Supply Account.				
Received		$7,273 43		$6,138 99
Expended		5,943 62		4,714 05
Excess of receipts		$1,329 81		$1,424 94

1886.	Maintenance Account, excess of receipts	$13,416 90
	Supply Account, excess of receipts	1,329 81
	Excess of total receipts over total expenditures	$14,746 71
	Expended on Construction Account (general)	1,048 98
	Balance due Sinking Fund	$13,697 73
1887.	Maintenance Account, excess of receipts	$19,807 93
	Supply Account, excess of receipts	1,424 94
	Excess of total receipts over total expenditures	$21.232 87
	Expended on Construction Account (general)	19,556 35
	Balance due Sinking Fund	$1,676 52

The excess of receipts for 1887, as shown in the above comparative statement, amounting to $1,676.52, has been carried to the Sinking Fund, as required by law.

Beside the manufactories, etc., supplied by meter, water is now supplied to 13,677 families, 843 stables, with 2,482 horses, and 242 cows, 243 shops, 457 offices and stores, by the following fixtures, viz:—

16,366 faucets,
4,454 wash-basins,
3,041 wash-tubs,
2,633 bath-tubs,
7,342 pan-closets,
847 slop-closets,
13 hopper-closets,
92 urinals,
44 yard hydrants,
4 fountains,
4 tumbler-washers,
1,316 hand-hose.

Also,

620 fire-hydrants, (beside 4 on private premises),
8 fire-reservoirs,
16 drinking-fountains in public squares.

The above is exclusive of the school houses, engine houses, police-stations and other city buildings.

The customary house to house inspection has been made, and considerable waste of water stopped as well as many charges for water-rates made for fractional parts of the year.

I would recommend the appointment of a second inspector, whose duty should be to look after outside business exclusively. The office work has increased in the last ten years 37 per cent, and within the past year the force to do the work has been decreased. As now arranged, the present Inspector is obliged to give a large part of his time to office work, and as the business of the office is rapidly increasing, his services for the coming year will be required almost constantly in the office. A competent man can earn for the city more than his salary as Inspector by picking up charges of water-rates, besides which he could maintain an almost constant lookout for waste of water, and should inspect (as the superintendent might direct) the various fire-pipes, to see that they were in proper condition.

Respectfully submitted,

WALTER H. HARDING,
Registrar.

REPORT

OF THE

COMMITTEE ON ACCOUNTS OF THE CAMBRIDGE WATER BOARD.

WE have examined the abstract of accounts as presented to us by the Water Registrar, covering the records of the past year. We have compared it with the statements submitted to us by the City Treasurer and Auditor, and we find them to be correct and in agreement. Annexed is the financial statement, in brief, presented to us by the Water Registrar, and verified by us:—

Amount of bills in hands of City Treasurer, November 30, 1886:—			
For water-rates		$324 10	
For supplies and repairs		1,380 78	$1,704 88
Amount of bills delivered to the City Treasurer for collection during the year ending Nov. 30, 1887:—			
For water-rates		$166,734 07	
For meter-rates		44,423 05	
For supplies and repairs		5,632 04	
For off and on, rent and seals		486 50	$217,275 66
Total bills			$218,980 54
Of these amounts the Treasurer reports as collected,		$217,455 91	
Less refunded	$1,789 82		
Less abated	4,321 96	$6,111 78	
Total net collections		$211,344 13	
Add refunded and abated, as above		6,111 78	
Balance uncollected, Nov. 30, 1887		1,524 63	$218,980 54

JAS. M. W. HALL,
WM. E. RUSSELL,
JOHN H. CORCORAN,
Committee on Accounts.

CAMBRIDGE, Dec. 1, 1887.

CITY OF CAMBRIDGE,
OFFICE OF CITY TREASURER,
December 1, 1887.

To the Cambridge Water Board:—

GENTLEMEN: Understanding that you desire from me figures showing the transactions for the Water rates account and the Supply account, I append the following:

Gross collections for account of water works, rates, fines, &c., from Dec. 1, 1886, to Nov. 30, 1887 inclusive, were .	$211,300 82
Abatements allowed on water rates to the amount of . .	4,305 86
Gross collections for account of water works supply account, were	$6,155 09
Abatements allowed on supply account amount to . . .	16 10
Refund checks paid amounting to	1,789 82
Bills for water-rates uncollected in my hands	636 90
Bills for water-rates, rent account uncollected in my hands	30 00
Bills for water supply account uncollected in my hands . .	857 73

Respectfully,

WM. W. DALLINGER,
City Treasurer.

CITY OF CAMBRIDGE,
December 12th, 1887.

To the Committee on Accounts of the Cambridge Water Board:—

GENTLEMEN: In accordance with your request I present the following statement from my books as of Dec. 1st, 1887.

WATER WORKS (RATES, FINES, ETC.).

Amount of uncollected bills in City Treasurer's hands Dec. 1st, 1886	$324 10
Amount of bills placed in City Treasurer's hands to Dec. 1st, 1887	211,643 62
Total	$211,967 72
Amount collected by City Treasurer to Dec. 1st, 1887 . .	211,300 82
Amount uncollected in City Treasurer's hands Dec. 1st, 1887	$666 90

Abatements	$4,321 96
Refunds	1,789 82

WATER WORKS (SUPPLIES).

Amount of uncollected bills in City Treasurer's hands Dec. 1st, 1886	$1,380 78
Amount of bills placed in City Treasurer's hands to Dec. 1st, 1887	5,632 04
Total	$7,012 82
Amount collected by City Treasurer to Dec. 1st, 1887	6,155 09
Amount uncollected in City Treasurer's hands Dec. 1st, 1887	$857 73

Respectfully submitted,

HARRY T. UPHAM,
Auditor of Accounts.

ANNUAL STATEMENT OF THE WATER REGISTRAR TO THE COMMITTEE ON ACCOUNTS, DECEMBER 1, 1887.

Water-rates unpaid Nov. 30. 1886		$324 10	
Bills placed in hands of City Treasurer for collection from Dec. 1, 1886, to Dec. 1, 1887:			
Water-rates from annual ledger	$151,419 00		
Water-rates, from fractional ledger,	15,315 07		
Water-rates, from meter ledger	44,423 05		
Off and on water	311 00		
Rent	78 00		
Seals	97 50		
		$211,643 62	
Total bills on rates, fines, etc.		211,967 72	
Supply and repair bills unpaid Nov. 30, 1886	$1,380 78		
Supply and repair bills placed in hands of City Treasurer for collection Dec. 1, 1886, to Dec. 1, 1887	5,632 04		
		$7,012 82	
Total bills			$218,980 54
There has been collected, annual ledger	$148,715 65		
There has been collected, meter ledger	43,933 63		
Amount carried forward	$192,649 28		

Amount brought forward	$192,649 28		
There has been collected, fractional ledger	13,889 18		
There has been collected, off and on	311 00		
There has been collected, rent	48 00		
There has been collected, seals	97 50		
Total collections, on rates, fines, etc.		$206,994 96	
Collections on supply and repair accounts		6,138 99	
Total collections		$213,133 95	
There have been abated, water-rates	$4,305		
There have been abated, supplies and repairs	16 10		
		$4,321 96	
There remain uncollected, water-rates	636 90		
There remain uncollected, rent	30 00		
There remain uncollected, supplies and repairs	857 73		
		$1,524 63	
			$218,980 54
Total collections	$213,133 95		
Less refunds,	1,789 82		
Total net receipts		$211,344 13	

Attest: WALTER H. HARDING,
Registrar.

REPORT

OF THE

SUPERINTENDENT OF THE WATER WORKS.

CAMBRIDGE, NOV. 30, 1887.

To the President and Members of the Cambridge Water Board:—

GENTLEMEN: The annual report of your Superintendent upon the condition of the works and the operations of the past year is herein presented.

The total amount of water pumped was 1,409,410,931 gallons. Coal consumed per million gallons pumped, 1,550$\frac{57}{100}$ pounds.

Water sold by meter and used for watering streets 362,547,100 gallons; leaving as the amount for domestic use 1,046,863,831 gallons.

Number of gallons daily for each inhabitant on the whole amount pumped, 5,524 gallons.

Number of gallons daily for each inhabitant on amount for domestic use, 4,103 gallons.

Spy and Little Ponds, Wellington Brook and Conduit.

The gate houses are in good condition. During the year no water has been drawn through the Conduit from either pond but it has been kept full to Black's Nook, to draft from in case of fire. A 30-in. pipe has been laid from Black's Nook through the dam to Fresh Pond.

Fresh Pond.

Cambridge Nook has been excavated to grade 7.00, about 64,000 cubic yards of material having been removed. A satisfactory arrangement was made with the Fitchburg Railroad Co. to furnish rails, locomotives and twenty dump-cars for the work; a track was laid, from the Hittinger ice house across the dam at Black's Nook and along the north shore, to and in Cambridge Nook. By this means nearly all the material was dumped into Black's Nook. The remainder was removed by carts, being used to grade Kingsley Park and the roadway on the east and north sides of Cambridge Nook where the riprapping has been raised to grade 18.00.

Boat-house Nook, from the east side around on the south side to the high bluff, has also been excavated to grade 7.00. All of this work was done with carts and wheelbarrows. Material from the east side was used in filling the low territory back of where the old boat-house formerly stood, this place being now raised to grade 18.00. The remainder was deposited on the south side and back of the roadway.

The City Council having dedicated the old gravel pit (near the Hittinger ice houses) to the use of the water works, a roadway has been laid out 70 ft. wide from Fresh Pond Drive towards Concord Avenue and graded to within 310 feet of the avenue, where it connects with the old road used by the City for carting gravel. As the old road is only 25 ft. wide, a strip of land 50 ft. wide must be purchased or otherwise obtained before the street can be finished of proper width to Concord Ave. When this is done it will complete a continuous driveway from Concord Ave. near the Belmont line, around the Pond to Concord Ave. again near the Boston Ice Co. houses.

Trees have been set out in Kingsley Park and around the Pond.

The low and flaring inlet pipe connected with the Stony Brook supply has been replaced by a straight 30-in. pipe, top at grade 16.00 or high water, fitted with a cap having one 6-in., eight 2-in., sixteen 1½-in. and twenty-four 1-in. nipples, converting the discharge into a fountain of attractive appearance from fifteen to twenty-five feet high. The pipe is protected by large stones laid up around it in conical form.

The roadway around the Pond has been kept in good condition but many improvements are needed to complete it for the popular drive it is destined to become. On the south side at the high bluff it needs widening to 40 ft. with guard-rail and hub-fender on the edge at top of the riprapping to prevent the possibility of driving over the edge of the slopes. Many places will require a coat of gravel in the spring. The gutters at the

Holworthy Street cut should be paved and the slopes sodded to prevent washing.

The grading of Kingsley Park has been completed.

The water in Fresh Pond reached its highest point May 1st, at grade 8.00, and stood at its lowest Nov. 5th at 3.32. At this date water was formerly let on from Stony Brook and the Pond has filled to 6.70 at the present date, a gain of 3.38 ft. in three weeks. To lower the Stony Brook Basin and facilitate the gate-house work, water was wasted through to Fresh Pond intermittently from Sept. 5th to the 29th, raising the water height from 3.52, Sept. 5th to 4.90, Sept. 29th a gain of 1.32 ft.

The ice protections of piling and plank around the gate-house at the auxiliary pumping station have been replaced by stone fountain walls, five feet thick at grade 4.00, battering to two feet thick at grade 18.00. When this had been done the brick walls of the gate-house were taken down and rebuilt on these foundations making the house two ft. longer each way, giving sufficient room to clean the screens without removing them from the house.

Pumping Works.

Except the sixteen days from May 1st to May 17th, the auxiliary pumps have been run constantly since Oct. 24th, 1886. After about three weeks they may never be needed again.

No repairs have been required on engine-house or coal sheds.

The grounds and Tudor Park have received necessary care.

Reservoirs.

Slight repairs have been made on the east side of the interior wall and more extensive work must be done early the coming season. The walks have been kept in order and grass cut.

High Service.

This system continues to work perfectly. No extension has been made.

Stony Brook Pipe Line.

In testing the line two pipes were burst in Watertown, one near Ætna mill and one on Arsenal street near the lumber yard. These pipes were replaced by new ones. Two leaks were found in Waltham, one near Frost's coal wharf and one near Loafer's Bridge. This leak was caused by a crack on top of the pipe, near the bell, and was repaired by a set-band around the pipe.

When the water was let on from Stony Brook in September, a leak was found at Holworthy Pond between the cut and the foot of Holworthy street. The pipe at this place was laid on piling which had settled for about 100 ft. in length and about 20 inches at the middle point, drawing out one joint. The pipe was raised to its proper grade and new piles driven to a solid foundation.

Main Pipe.

Main pipes have been laid in the following streets: — 715 ft. of 4-in. in Appleton St., 115 ft. of 4-in. in Auburn St., 650 ft. of 30-in. through dam at Black's Nook, 6 ft. of 6-in. in Bow and Arrow Sts., 12 ft. of 6-in. in Bolton and Houghton Sts., 5 ft. of 6-in. in Brattle and Fayerweather Sts., 6 ft. of 6-in. in Brattle St. and Fresh Pond Lane, 6 ft. of 6-in. in Brattle St. and Lake View Ave., 7 ft. of 6-in. in Brattle and Larch Sts., 673½ ft. of 4-in. in Brendon St., 318 ft. of 4-in. in Brewster Court, 1 ft. of 4-in. in Brookline and Franklin Sts., 3 ft. of 10-in. in Cambridge St., 3½ ft. of 1½-in. and 223 ft. of 6-in. in Clifton St., 3 ft. of 1½-in. and 228 ft. of 4-in. in Cottage Court, 60 ft. of 6-in. in Crescent Ave., 486 ft. of 6-in. in Cushing St., 2 ft. of 4-in. and 243 ft. of 2-in. in Deacon St., 3½ ft. of 1½-in., 188 ft. of 4-in. and 4 ft. of 6-in. in Dinsmore Court to replace old 1½-in. pipe abandoned, 3 ft. of 1½-in. and 132 ft. of 4-in. in Dudley St., 3½ ft. of 1½-in. and 225 ft. of 4-in. in Green St., 3 ft. of 4-in. in Green and Pearl Sts., 3½ ft. of 1½-in. and 192 ft. of 4-in. in Hammond St., 3½ ft of 1½-in. and 340 ft. of 8-in. in Harvey St., 3 ft. of 1½-in. and 122½ ft. of 4-in. in Hayes Ct., 70 ft. of 4-in. in Hews St., 2 ft. of 8-in. in Highland St., 3½ ft. of 1½-in. and 211 ft. of 4-in. in Irving Place, 48 ft. of 6-in. in Lambert Ave., 4 ft. of 4-in. in Magazine and Auburn Sts,, 3 ft. of 4-in. in Magazine and Erie Sts., 2 ft. of 4-in. in Magazine and Fairmont Sts., 2 ft. of 4-in. in Magazine and Prince Sts., 3 ft. of 1½-in. and 204 ft. of 4-in. in Magee St., 17 ft. of 6-in. in Main St., 5 ft. of 6-in. in Main and Austin Sts., 3 ft. of 6-in. in Main and Columbia Sts., 6 ft. of 6-in. in Main and Winsor Sts., 566 ft. of 6-in. in Montgomery St., 3½ ft.

of 1½-in and 100 ft. of 8-in. in Ninth St., 76 ft. of 6-in. in North Ave. and Chester St., 16 ft. of 6-in. in North Ave. and Day St., 79 ft. of 6-in. in North Ave. and Dover St., 12 ft. of 6-in. in North Ave. and Spruce St., 20 ft. of 6-in in Oak St. opposite Bolton St., 3 ft. of 3-in in Pearl and Allston Sts., 3 ft. of 6-in. in Pearl and Erie Sts., 2 ft. of 6-in. in Pearl and Hamilton Sts., 3 ft., of 6-in. in Pearl and Lake Sts., 2 ft. of 4-in. in Pilgrim and Brookline Sts., 577 ft. of 1-in. in Portland St., 212 ft. of 4-in. in Prescott St., 3 ft. of 6-in. in Prospect and Oak Sts., 3 ft. of 6-in. in Prospect St. and Webster Ave., 3 ft. of ¾-in. in River and Kinnaird Sts., 3 ft. of 4-in. in River and Rockwell Sts., 36 ft. of 4-in. in Rockingham St., 55 ft. of 4-in. in Rutland St., 241 ft. of 4-in. in Second St., 279 ft. of 6-in in Sparks St., 72 ft. of 4-in. in Spring St., 71 ft. of 4-in. in South St., Somerville, 3 ft. of 6-in. in South and Earle Sts., 3½ ft. of 1½-in. and 162 ft. of 6-in. in Vine St., 3 ft. of 1½-in., 3 ft. of 4-in. and 127 ft. of 6-in. in Western Ave., 3½ ft. of 1½-in. and 441 ft. of 4-in. in Woodlawn Ave.

In Chester and Dover Streets the pipe from the hydrant to the main pipe in North Avenue was enlarged from 4-in. to 6-in.

New Supplies.

Three hundred and twenty-two new supplies have been laid, making a total of 9,413. Nineteen supplies have been renewed and the 12 supplies in Dinsmore Court had to be renewed their entire length on account of new main being laid at grade. The old fittings were laid so deep they were considered not worth digging for. Twenty supplies have been furnished with sidewalk shut-offs. Two have been enlarged.

Leakage.

Three hundred and eighty-eight leaks have been stopped, namely: — one on 2-in. main, ten on 4-in. main, three on 6-in. main, one on 12-in. main and one on 30-in. main, thirty on supplies in streets and 342 on premises, reported by inspectors and repaired by owners or occupants.

The main pipes in Main Street, Murray Street and Putnam Avenue, and in the low territories of East Cambridge have been inspected. No general inspection of pipes and fixtures, other than that made by the inspectors while canvassing, has been made.

Drinking Fountains.

The number of drinking fountains at this date is fifteen.

Standpipes for Street Watering.

Five standpipes have been put in the following locations: — one in Mount Auburn and Willard Streets, one in Mount Auburn Street and Coolidge Avenue, one in Coolidge Avenue near stable, one in Walden Street and one in Fresh Pond Lane, making a total of 45.

Gates.

All of the gates have been inspected and put in good condition.

Boxes.

Twenty-two hydrant boxes, 41 gate boxes, 17 cock boxes and 48 iron boxes have been set in place of decayed ones removed.

Hydrants.

Twenty new hydrants have been set during the year. Five were set for the City of Somerville, three of which were Pattee's, and their nozzles were changed to fit the Somerville hose-nipples. All of the others, excepting the Coffin hydrant set for Page's Fire Supply in Hampshire Street, were Chapman. Nineteen flush hydrants have been removed, making the total number now in use 613.

The flush hydrants removed were located as follows: — Brattle and Fayerweather Sts., Brattle St., and Fresh Pond Lane, Brattle St. and Lake View Ave., Brattle and Larch Sts., Bolton and Houghton Sts., Concord Ave. and Sparks St., Main St., opposite Kendall and Sons., Main and Columbia Sts., Main and Austin Sts., Main and Winsor Sts., North Ave. and Chester St., North Ave., and Day St., North Ave and Dover Sts. North Ave. and Spruce St., Prospect and Oak Sts., Prospect St. and Webster Ave., South and Gore Sts., South and Willow Sts., and Somerville Ave. and White St.

There are five flush hydrants on private premises, viz: two on premises of New England Glass Co. on North St., two on premises of Boston and Lowell Railroad Co., on Prison Point St., and one on premises of C. L. Jones & Co., on Pearl St.

The number of street reservoirs now in use is eight.

Brookline Street Pipe Bridge.

The west side of Brookline Street Pipe Bridge has been sheathed with 2-in. spruce plank from the bottom up three feet. to protect the pine sheathing from the ice pressure.

The siphon has been pumped out.

Pipe Yard.

The yard has been graded. The buildings, excepting the stable, which needs painting, are in good repair.

The following tables show the location of meters, fountains, and standpipes, the details of main and supply extension, and the account of stock on hand.

List of Meters in Use November 30, 1887.

Meters.	Locality.	Sizes.	Description.
Alghieri, Simon	Main St.	¾	Worthington
Andrews, D. H.	Sixth St.	1	"
American Steam Laundry	Osborn St.	1	Crown
" Net & Twine Co.	Third St.	1½	Worthington
" Rubber Co.	Potter St.	4	Crown
" Steam Safe Co.	Main St.	1	Worthington
" " " "	Main St.	2	Union
" " " "	Main St	1	Crown
Barbour, W. O.	Osborn St.	1	Worthington
" " "	Osborn St.	¾	Desper
Brown & Co.	First St	¾	Worthington
Bowman & Co.	Frank St.	¾	"
Blake, I. W	Church St.	1	"
" " "	Palmer St.	¾	Ball and Fitts
Bay State Brick Co.	Spruce St.	¾	Worthington
Barnes, F. G.	Cambridge St.	1½	"
Balcom, A. W.	Austin St	¾	Union
Bird, H. M.	Broadway	⅝	"
Bullock, O. L.	Broadway	¾	Worthington
Burton, A. & E.	Harvard St.	¾	"
Boston Woven Hose Co.	Hampshire St.	4	"
Boston Stamping Co.	Third St.	1½	Union
B. & L. R. R. (Repair Shop)	Bridge St.	2	Worthington
" " " (Round-house)	Prison Point St.	2	"
" " " (Round-house)	Prison Point St.	2	"
" " " (Paint Shop)	Prison Point St.	1	"
" " " (Car-house)	Prison Point St.	2	"
" " " (Filling locom.)	Prison Point St	6	Union
Carr Bros.	Lopez St.	1	Worthington
Cambridgeport Diary Co.	Magazine St.	1	Worthington.
Cambridge Electric Light Co.	Main St.	1½	Union
Cambridge Gas Light Co.	Third St.	1½	Crown
Cambridge Gas Light Co.	Ash St.	¾	Worthington
Cambridge Hospital	Mount Auburn St.	1½	Crown
Campbell Bros.	Osborn St.	¾	"
City of Cambridge, Shepard Sch.	North Ave.	2	Worthington
" " " Ward 1 Bld.	Brattle Sq.	1½	"
" " " Ward 4 Bld.	Central Sq.	1½	"
" " " Upton Sch.	Upton St.	2	"
" " " Latin Sch.	Lee St.	1	"
" " " Cemetery	Coolidge Ave.	4	"
" " " Almshouse	Tannery St.	2	"
Cambridge R. R. Co., Stable	Green St.	¾	"
" " "	Brookline St.	1	"
" " Waiting Room.	Main St.	¾	Union
" " Paint Shop	Dunster St.	¾	Worthington
" " Repair Shop	Dunster St.	¾	"
" " Car House	Dunster St.	¾	"
" " Stable	Dunster St.	¾	"
" " Stable	Dunster St.	1	"
" " Office	Harvard Sq.	¾	Crown
" " Washing Cars	Murray St.	1½	"
" " Stable	Murray St.	1½	Worthington
" " Car House	Cambridge and Baldwin	1	Desper
" " Stable	Baldwin St.	1	Worthington
" " "	Cambridge St.	1	"
" " "	Cambridge St.	1	"
" " "	Cambridge St.	1	"
" " "	Mount Auburn St.	2	Crown
" " "	North Ave.	2	Worthington
" " "	Main St.	2	Worthington
" " "	River St.	1	"
" Y. M. C. Association	Central Sq.	2	"
Cushman Bros.	Main St.	¾	Union
Close George	Broadway	1	Worthington
Caswell & Coolidge	Franklin St.	1	"
Coleman Bros.	Broadway	1	"
Clark, B. P. & Co.	Main St.	1½	"
Cochran & Co.	Potter St.	1	Crown
Childs & Co.	Main and Osborn Sts.	¾	Union
Cass, Fred.	Auburn St.	4	Crown
Cofran, L. M.	Concord Ave.	2	Worthington
Coolidge, J. G., Greenhouse	Coolidge Ave.	1	"

List of Meters.—*Continued.*

Meters.	Locality.	Sizes.	Description.
Coolidge, J. G., Barn	Coolidge Ave	2	Worthington
Davis, Curtis & Co	Broadway	2	“
Davis, J. C. & Co	Broadway	2	Crown
Dugan & Rutherford	First St	1	“
Daniels, Badger & Co	Albany St	2	“
Davenport, A. H	Cambridge St	2	Worthington
Davenport, A. H	Otis St	¾	Crown
Dailey, C. W.	Cambridge St	1	Worthington
Derby, H	Main St	1	Crown
Dover Stamping Co	Pleasant St	6	Union
Downing, Theo	Eustis Ct	1	Worthington
Draper, Francis & Co	Otis St	¾	“
Dow, Davis & Co	Portland St	2	Crown
Day Cordage Co	Rogers st	2	“
Dee, T. W	Brattle St	1	“
East Cambridge Club Stable	First St	1	Worthington
Episcopal Seminary	Brattle St	1½	Worthington
Furfey, James	Brookline St	¾	“
Fischer, F	Tannery St	2	Union
Geldowsky, F	Thorndike St	2	“
Gilmore & Eustis	Portland St	2	Worthington
Goepper Bros	Ninth St	1½	“
“ “	Spring St	2	“
Greely, Leander	Broadway	1½	“
Griffin & Dolan	Decatur St	⅝	Crown
Hazen, D. M	Elm St	1	Worthington
Holton, Fred H. & Co	Broadway	2	“
Harvard College, Holworthy Hall	College Grounds	¾	“
“ “ Boylston Hall	“ “	2	Crown
“ “ Stoughton Hall	“ “	¾	Worthington
“ “ Sever Hall	“ “	¾	Crown
“ “ Thayer Hall	“ “	1½	Worthington
“ “ In Yard	“ “	1½	“
“ “ Memorial Hall	Cambridge St	2	“
“ “ Boat House	De Wolf St	1	Union
“ “ Botanic Garden.	Garden St	1	Crown
“ “ Gymnasium	Cambridge St	1½	“
“ “ Holyoke House	Harvard St	2	Worthington
“ “ Museum	Divinity Ave	1	“
“ “ Scientific School	Kirkland St	¾	“
“ “ Law School	Holmes Pl	1½	“
“ “ Laboratory	“ “	1	“
“ “ Jarvis Field	Everett St	¾	“
“ “ Holmes Field	North Ave	2	Union
Mason & Hamlin	Broadway	1½	Crown
Middlesex Bleachery	Sacramento St	1	Worthington
Middlesex Co. Court House	Otis St	¾	“
“ “ Reg. of Deeds	“ “	¾	“
“ “ House of Cor	Thorndike St	4	Union
“ “ Court House	“ “	¾	“
Millan, Alex	Brattle Sq	¾	Crown
Moore, Chas	Farwell Pl	1	Worthington
Moering, Mrs. A. L	Main St	1	“
Murdock, W. H	Griggs St	⅝	Ball and Fitts
Mount Auburn Greenhouse	Brattle St	1	Worthington
Mount Auburn Cemetery	Mt. Auburn St	⅝	Desper
Maverick Oil Works	Sixth St	2	Worthington
Miller & Shaw	Broadway	1	“
Morrill & Allen	Main St	¾	Crown
New England Glass Works	North St	2	Union
“ “ “ “	“ “	2	Worthington
Norton, E. H	Windsor St	1	“
O'Brien, John F	Coolidge Ave	¾	“
Page, George G. & Co	Hampshire St	2	“
Page, George G. & Co	“ “	4	Union
Parry Bros	Raymond St	¾	Worthington
Patterson, R. J	Cedar St	2	Union
Pray & Mayall	Third St	2	Crown
Porcellian Club	Harvard St	1	“
Porter's Hotel	North Av	¾	Worthington
Phillips Geo. L	Main St	¾	“
Hawley Machine Co	First St	1	Worthington
Hilton J. M	Harvard St	1½	“

List of Meters.—*Continued.*

Meters.	Locality.	Sizes.	Description.
Hazlett & Underhill	First St	1½	Worthington
Hewes, A. H. & Co.	Richdale Ave	1	"
Holt & Bugbee	East St	¾	"
Hovey & Co.	Cambridge St	1	"
Houghton, H. O. & Co.	Blackstone St	6	Union
" "	" "	⅝	Crown
" "	" "	2	Worthington
Howe & Putney	Distillhouse St	1	"
Howland, W. B.	Linden St	⅝	Crown
Hopkins, J. H. T.	Prospect St	¾	Worthington
Ivers & Pond, 1	Main & Albany Sts	2	"
Ivers & Pond. 2	" " " "	2	Crown
Johnson & Doane	Green St	¾	Worthington
Jones, C. L. & Co.	Pearl St	¾	"
Keeler & Co.	Main St	1	Union
Kemp, L. & Sons	Davis St	1	Worthington
Kennedy, Frank & Co.	Green St	1½	"
Kennedy, Frank & Co	Franklin St	1½	Union
Kendall & Sons, Engine Room	Main St	¾	Worthington
" " Boiler Shop	" "	¾	"
" " Foundry	" "	¾	"
Low, J. W.	Reed St	1½	"
Little, Brown & Co.	Blackstone St	¾	Union
Lamb & Ritchie	Albany St	1	Crown
Ross House	Broadway	¾	Worthington
Reardon, John & Sons	Waverly St	4	"
Revere Sugar Refinery	Water St.	3	"
" " "	" "	3	Union
Reversible Collar Co.	Mt. Auburn St	1	Worthington
Rawson & Morrison	Main St	¾	Ball and Fitts
Rougher, M.	B. & L. R. R. Yard	2	Union
Rideout. M. E.	State St	1	Worthington
Roberts, O. P.	Brattle Sq.	1	"
Ross, A. M.	Main St	¾	"
Rogers, Geo. M.	Washington St	3	"
Russell & Zerega	State St.	¾	"
Sands, M. W.	Walden St	¾	Crown
Sands, M. W.	Dublin St	¾	Union
Sands, M. W	" "	⅝	Worthington
Shorey, Geo. L.	Kinnaird St	4	Union
Smart, D. C.	Main St	2	Worthington
Saurman. B. F.	Gore St	¾	Union
Sortwell, D. R. & Co.	Distillhouse St	2	Worthington
St. Mary's Church	Norfolk St	2	"
" " Gymnasium	Harvard St	¾	"
" " Aquinas Hall	" "	1	"
Spear, Gregory & Co.	Rogers St	1½	"
Slavens, J. W. L.	Bridge St	1	Crown
Squire, J. P. & Co	Gore St	2	Worthington
" " " Stable	" "	1	"
" " "	" "	4	Union
" " "	" "	6	Gem
Schaeffer Electric Light Co.	Main St	¾	Union
Sweetzer Bros.	Otis St	¾	Worthington
Tower, Sylvester	Broadway	2	Worthington
Thurston, Hall & Co	Elm St	1	"
Teele, Frank H.	Lincoln Ct	¾	"
Thayer, Henry & Co	Broadway	2	"
Tracy, M. F.	Boylston St	1	Desper
Temple, F. L.	Kirkland St	2	Worthington
Union Pacific Tea Co.	Main St	⅜	Union
Uhrig, Joseph	" "	1½	Worthington
Union Glass Co.	Webster Ave	⅝	Crown
" " "	" "	1	Worthington
Varnum, W. H.	Putnam Av	¾	"
Whitney, W. H.	Main St	¾	Crown
Wilson, John & Son	Brattle Sq.	1	Union
Woodbridge, S. F.	Frank St	1	Balance Valve
Waitt & Watts.	Otis St	1	Worthington
Wight & Scorgie	Mt. Auburn	⅜	Crown
Wilkins, Wm.	Earl St	1	"
Woodbury, J. A.	First St	2	Union

Accompanying this report is that of the engineer at the Pumping Station, with a full account of the operations at the Engine-house.

Respectfully submitted,

HIRAM NEVONS,
Superintendent.

List of Drinking Fountains, Nov. 30, 1887.

Bridge Street, junction of Cambridge Street.
Broadway, corner of Norfolk Street.
Brattle Square, east side at Brewer's Block.
Brattle Street, junction of Fresh Pond Lane.
Central Square, west side.
Central Square, east side.
Garden Street, at Washington elm.
Hampshire Street, junction of Broadway.
Harvard Square, at the flag-staff.
Inman Square, east side.
Main Street, junction of Broadway.
Main Street, junction of Mt. Auburn Street.
North Avenue, corner Walden Street.
North Avenue, north side, west of Cameron Street.
Putnam Avenue, corner Brookline Street.

List of Stand-Pipes for Street Watering, Nov. 30, 1887.

Brattle Street, near University Press.
Brattle Street, corner Sparks Street.
Brattle Street, near Fayerweather Street.
Brattle Street, near Fresh Pond Lane.
Bridge Street, junction Cambridge Street.
Broadway, near Third Street.
Broadway, corner Sixth Street.
Broadway, corner Winsor Street.
Broadway, junction Hampshire Street.
Brookline, corner Putnam Avenue.
Cambridge Street, near Warren Street.
Cambridge Street, near Winsor Street,
Cambridge Street, at Inman Square.
Columbia Street, near Austin Street.
Concord Avenue, near Wyeth Street.
Coolidge Avenue, opposite entrance to Mt. Auburn Cemetery.
Dana Street, corner Chatham Street.
Fresh Pond Avenue, opposite Vassal Lane.
Gore Street, west of Third Street.
Green Street, near Western Avenue.

Garden Street, near Chauncy Street.
Harvard Street, corner Prescott Street.
Inman Street, near Broadway.
Kirkland Street, near Quincy Street.
Main Street, near Portland Street.
Main Street, near Hancock Street.
Magazine Street, opposite Warland Street.
Mt. Auburn Street, near Athens Street.
Mt. Auburn Street, near Willard Street.
Mt. Auburn Street, corner Coolidge Avenue.
North Avenue, near Common.
North Avenue, corner Sacramento Street.
North Avenne, near Roseland Street.
North Avenue, near Beech Street.
North Avenue, near Spruce Street.
North Avenue, corner Norris Street.
North Avenue, opposite Tannery Street.
Prison Point Street, opposite Round House.
River Street, near Putnam Avenue.
Sixth Street, near Thorndike Street.
Spruce Street, corner Cedar Street.
Third Street, near Rogers Street.
Thorndike Street, near Third Street.
Western Avenue, corner Howard Street.
Walden Street, corner Mt. Pleasant Street.

Main Pipe Laid, Number of Gates and Fire Hydrants.

LOCATION.	IRON PIPE.		GATES.		HYDRANTS.	
	Length.	Size.	No.	Size.	No.	Size.
	Feet.	Inch.		Inch.		Inch.
Appleton Street	715	4	2	4	....	....
Auburn Street	115	4	1	4	....	....
Black's Nook	650	30	....	....	....	...
Bow and Arrow Streets	6	6	....	....	1	6
Bolton and Houghton Streets	12	6	....	....	1	6
Brattle and Fayerweather Sts.	5	6	....	....	1	6
Brattle and Fresh Pond Lane	6	6	....	....	1	6
Brattle and Lake View Ave.	6	6	....	....	1	6
Brattle and Larch Streets	7	6	....	....	1	6
Brendon Street	673½	4	1	4	....	....
Brewster Court	318	4	....	....	....	....
Brookline and Franklin Sts.	1	4	1	4	....	....
Cambridge Street	3	10	1	10	....	....
Clifton Street	3½	1½	....	....	....	....
Clifton Street	223	6	1	6	....	....
Cottage Court	3	1½	....	....	....	....
Cottage Court	228	4	1	4	....	....
Crescent Avenue	60	6	....	....	1	6
Cushing Street	486	6	....	....	....	....
Deacon Street	243	2	....	....	...	....
Deacon Street	2	4	....	....	....	....
Dinsmore Court	3½	1½	....	....	....	....
Dinsmore Court (renewal)	188	4	1	4	....	....
Dinsmore Court	4	6	....	....	....	....
Dudley Street	3	1½	....	....	....	....
Dudley Street	132	4	....	....	....	....
Green Street	3½	1½	....	....	....	....
Green Street	225	4	1	4	....	....
Green and Pearl Streets	3	4	1	4	....	....
Hammond Street	3½	1½	....	....	....	....
Hammond Street	192	4	....	....	....	....
Hampshire Street	....	....	....	....	1	6
Harvey Street	3½	1½	....	....	....	....
Harvey Street	340	8	....	....	..	....
Hayes Street	3	1½	....	....	....	....
Hayes Street	122½	4	1	4	....	....
Hews Street	70	4	....	....	....	....
Highland Street	2	8	1	8	....	....
Irving Place	3½	1½	....	....	....	....
Irving Place	211	4	1	4	....	....
Lambert Avenue	48	6	....	....	....	....
Magazine and Auburn Sts.	4	4	1	4	...	....
Magazine and Erie Streets	3	4	1	4	....	....
Magazine and Fairmont Sts.	2	4	1	4	....	....
Magazine and Prince Streets	2	4	1	4	....	....
Magee Street	3	1½	....	....	....	....
Magee Street	204	4	....	....	....	....
Main Street	17	6	....	....	2	6
Main and Austin Streets	5	6	....	....	1	6
Main and Columbia Streets	3	6	....	....	....	....
Main and Windsor Streets	6	6	....	....	1	6
Mason and Garden Streets	....	....	1	6	...	....
Montgomery Street	566	6	....	....	....	....
Montgomery and Dudley Sts.	....	....	1	6	....	....
Montgomery and Harvey Sts.	....	....	1	6	....	....
Ninth Street	3½	1½	....	...	....	....
Ninth Street	100	8	1	8	....	....
North Ave. and Chester St.	76	6	1	6	1	6
North Ave. and Day St.	16	6	....	....	1	
North Ave. and Dover St.	79	6	1	6	1	
North Ave. and Spruce St.	12	6	....	....	1	
Oak, opp. Bolton Street	20	6	....	....	1	
Pearl and Allston Streets	3	3	1	3	....	....
Pearl and Erie Streets	3	6	1	6	....	....
Pearl and Hamilton Streets	2	6	1	6	....	....
Pearl and Lake Streets	3	6	1	6	....	....
Pilgrim and Brookline Sts.	2	4	1	4	....	....
Portland Street	577	1	....	....	...	....

Main Pipe Laid, Number of Gates and Fire Hydrants.

(Continued.)

LOCATION.	IRON PIPE.		GATES.		HYDRANTS.	
	Length.	Size.	No.	Size.	No.	Size.
	Feet.	Inch.		Inch.		Inch.
Prescott Street................	212	4	1	4	....	....
Prospect and Oak Streets....	3	6	1	6	1	6
Prospect and Webster Ave...	3	6	1	6	1	6
River and Kinnaird Streets..	3	¾	1	3	....	....
River and Rockwell Streets..	3	4	1	4	....	....
Rockingham Street...........	36	4	....	...	....	....
Rutland Street......	55	4	....	....	....	....
Second Street..................	241	4	....	....	....	....
Sparks Street..................	279	6	1	6	....	....
Spring Street..................	72	4	....	....	....	....
South Street (Somerville).....	71	4	....	....	....	...
South and Earle Streets......	3	6	....	....	1	6
Vine Street............	3½	1½	....	....	....	....
Vine Street....................	162	6	....	....	....	....
Western Avenue..............	3	1½	....	....	....	....
Western Avenue..............	3	4	1	4	....	....
Western Avenue..............	127	6	1	6	....	....
Woodlawn Avenue............	3½	1½	....	....	....	....
Woodlawn Avenue............	441	4	1	4	....	....

Recapitulation.

	30 Inch.	10 Inch.	8 Inch.	6 Inch.	4 Inch.	3 Inch.	2 Inch.	1¼ Inch.	1 Inch.	¾ Inch.	Total.
Length in feet of iron pipe........	650	3	102	2588	4547	3	243	46½	577	3	8762½
No. of gates.......	....	1	2	13	20	2	...	....	....	....	38
No. of hydrants...	....	....	....	20	....	....	....	....	....	....	20

New Supplies.

	6 Inch.	4 Inch.	2 Inch.	1½ Inch.	1¼ Inch.	1 Inch.	¾ Inch.	Total.
Length in feet of pipe laid...........	14½	389	344½	162½	693	2284½	9495½	13,383½
Number of supplies..................	1	1	8	6	18	44	244	322
Number of stop and waste cocks.....	....	....	6	6	18	45	245	320
Number of screw cocks................	....	....	2	6	18	43	247	316
Number of sidewalk cocks	....	....	....	....	1	44	244	289
Number of service boxes..............	....	....	....	....	1	44	243	288
Number of boxes, frames and covers.	....	....	...	....	....	....	....	36

List of Check-Valves.

OLD HIGH-SERVICE.

	Size in inches.
Lake View Avenue, 150 feet north from Huron Street	10
Lake View Avenue, 150 feet north from Brattle Street	6
Fayerweather and Reservoir Streets	6
Concord Avenue, 135 feet south from Buckingham Street	6
Buckingham Street, 220 feet west from Concord Avenue	6
Garden and Linnæan Streets	6
Raymond and Linnæan Streets	6
Avon Hill and Linnæan Streets	6
Arlington Street, 230 feet west of North Avenue	6
Mt. Vernon Street, 100 feet west from North Avenue	6
Mt. Pleasant Street, 150 feet south from Walden Street	6

NEW HIGH-SERVICE.

	Size in inches.
Highland Street, on old 12-inch main	12
Dana Street and Broadway	4
Harvard Street, near Hancock	6
Centre Street, near Hancock	4
Dana Street, near Main	4
Harvard and Ellery Streets, two valves	6
Harvard and Trowbridge streets, two valves	4
Harvard and Ware Streets	4
Harvard and Prescott Streets	4
Quincy Street, near Broadway	4
Broadway, on line of 6-inch pipe crossing College Grounds	6
Waterhouse Street, near small common	6
Kirkland and Cambridge Streets	10
Berkeley Street, near Craigie	4
Appian Way, near Brattle Street	4
Linnæan and Lancaster Streets (old high-service extension)	6
Kirkland Street and Frisbie place	4

Statement of Stock on Hand Dec. 1, 1887.

FOR STREET MAINS (IRON PIPES AND FITTINGS).

	48 in.	36 in.	30 in	24 in.	20 in.	16 in.	12 in.	10 in.	8 in.	6 in.	4 in.	3 in.
Straight pipes, 12 feet each	2	2	15	. .	21	10	1	20	170	450	423	. .
Bends	. .	. .	1	3	2	2	2	9	9	9	6	. .
Y branches	. .	. .	. .	1	1–12	. .	1	. .	. .	. .	. .	. .
Sleeves	. .	2	1	4	7	2	2	4	9	11	4	8
Clamp sleeves	. .	. .	. .	8	8	3	4	7	4	8	6	3
Drain-offsets	. .	. .	. .	. .	. .	. .	. .	. .	. .	8	. .	. .
Offsets	. .	. .	. .	. .	. .	. .	. .	6	4	13	6	. .
Gates	. .	. .	. .	. .	. .	. .	. .	1	2	3	6	2
Caps	. .	. .	. .	. .	. .	2	8	2	4	11	8	. .
Blow-off branches	. .	. .	. .	. .	2–6	. .	. .	. .	. .	. .	. .	. .
Cl'mps f'r c'mt pipe	. .	. .	. .	. .	2	. .	. .	. .	. .	. .	. .	. .
Check-valves	. .	. .	. .	. .	2	. .	. .	1	. .	. .	. .	. .
T's	. .	. .	1–6	1–24	2–20	2–6	3–8	3–8	14–8	13–6	12	2
"	. .	. .	. .	1–20	1–12	. .	. .	10–6	1–6	9–4	. .	. .
"	. .	. .	. .	1–16	2–6	. .	. .	. .	1–4	. .	. .	. .
"	. .	. .	. .	1–8	. .	. .	. .	. .	. .	. .	. .	. .
"	. .	. .	. .	3–6	. .	. .	. .	. .	. .	. .	. .	. .
Crosses	. .	. .	. .	. .	1–20	1–12	5–10	2–8	2–4	6–6	16	2
"	. .	. .	. .	. .	2–10	3–6	6–4	2–10	. .	8–4	. .	. .
"	. .	. .	. .	. .	. .	. .	7–6	8–6	. .	. .	. .	. .
Reducers	. .	. .	. .	1–10	2–12	1–6	2–6	1–8	8–6	26–4	1–3	. .
"	. .	. .	. .	. .	1–8	. .	. .	. .	. .	. .	. .	. .

FOR SUPPLIES (GALVANIZED PIPE AND BRASS FITTINGS).

	2-in.	1½-in.	1¼-in.	1-in.	¾-in.
Feet in length of galvanized pipe	710	324	394	400	800
Elbows	37	37	35	45	65
Street elbows	. .	. .	. .	36	26
Couplings	27	50	40	90	80
Unions	43	35	35	51	56
Brass unions for lead connections	. .	. .	. .	. .	34
Faucets	. .	. .	. .	12	6
Stop and waste cocks	4	19	11	18	73
Screw-cocks	11	16	7	8	72
Sidewalk-cocks	. .	. .	. .	15	333
Screw-cock for cement pipes	. .	4	. .	25	. .
Blow-off cocks	. .	9	. .	. .	. .
Air chambers	. .	. .	. .	43	14
Socket end of rods, 38	. .	. .	. .	. .	. .
Nipples	80	112	100	273	365
Plugs	15	20	45	57	15
Bushings	27	58	110	25	1
Fountain-cocks	. .	. .	. .	. .	10
Sill-cocks	. .	. .	. .	. .	6
Hose-nipples	. .	. .	. .	. .	6
Sill-valves, nickle-plated	. .	. .	. .	. .	6
T's	24	. .	68	90	167
Lot of cast-iron T's and crosses	. .	. .	. .	. .	. .
Caps	52	12	19	34	28
Reducing couplings	5	30	15	13	13
Stand pipes, 87	. .	. .	. .	. .	. .
Clips, 36	. .	. .	. .	. .	. .
Lead connections	. .	. .	1	12	26
Hydrant-cocks	. .	. .	. .	1	11
Check-valves	1	1	1	4	4
Cement cocks	. .	. .	. .	19	. .
Chapman valves	3	1	. .	. .	1

Stock in Shop and Yard.

3 hydrant-valves.
9 bolts for flush hydrants.
21 stop and wastes for flush-hydrants.
4 lead kettles.
3 furnaces.
3 ladles.
3 bench vises.
4 drinking-fountains.
8 bands for capping main-pipe.
1 meter-box.
1 iron box.
12 hydrant boxes.
9 wooden gate-boxes.
2 cock-boxes.
38 large frames and covers for gates.
25 large frames and covers for hydrants.
22 small frames and covers for gates.
171 risers for wooden boxes.
245 seals.
1 breast drill.
1 rachet for tapping main pipe.
3 machines for tapping cement pipe.
1 washer cutter.
1 platform scales.
2 grindstones.
1 diaphragm pump.
1 hand pump.
8 thawing-out pumps.
200 feet thawing-out pipe.
½ barrel clay.
2 hatchets.
3 hoes.
1 hay cutter.
3 small derricks.
1 breast derrick.
13 pipe wrenches.
2 nut wrenches.
6 monkey wrenches.
30 nuts.
1 axe.
4 sledge hammers.
lot of old junk.
4 gallons oil.
1 pair long leg boots.
1 cord wood.
25 feet ¾-in. hose.
½ cask cement.
100 feet 2-in. pipe.
8 screw-drivers.
3 saws.
1 floating hook.
1 large mall.
1 barrel R. R. spikes.
plane, square, compasses, etc., for carpentering.
Lot of lumber.
Lot of spindles for 4-inch and 6-inch gates.
5 horses.
6 wagons.
6 harnesses.
2 sleighs.
2 double-runner sleds.
8 blankets.
2 buffalo robes.
2 lap robes.
3 oil-coverings for horses.
1 lathe, with usual chucks and tools.
1 water motor.
1 threading machine with dies complete.
1 drilling machine with drills complete.
3 tapping machines for supplies, with taps and drills.
4 hooks for tapping main pipe.
2 2-inch taps and drills.
8 pipe cutters.
7 pipe tongs.
4 sets main pipe tools.
10 gate wrenches.
4 blow-off wrenches.
1 2-inch cock wrench.
1 30 over-flow bell.
1 stove with fixtures.
1 tank for measuring water.
1 work bench with drawers.
1 work bench.
1 clock.
4 jugs.
67 block stones.
4 wooden horses.
9 oil cans.

8 die-plates, with dies.
1 tool chest.
1 hand cart.
9 chains.
82 shovels.
3 snow shovels.
28 picks.
21 trench rammers.
2 paving rammers.
11 pails.
4 iron bars.
2 wheelbarrows.
2 tamping bars.
1070 pounds lead.
50 pounds packing.
4 hydrant bodies.
1 set hydrant tools.
3 rakes.
Lot of old flush-hydrants.
8 post-hydrants.
19 post-hydrant rods.
5 hammers.
1 plough.
1 drag.
36 wooden plugs.
Lot of block and wedges.
Lot of counters and rachet movements for meters.
2 ¾-inch Worthington meters.
10 1-inch Worthington meters.
1 3-inch Worthington meter.
1 4-inch Worthington meter.
1 ¾-inch Union Rotary meter.
1 1-inch Union Rotary meter.
1 1½-inch Union Rotary meter.
1 ¾-inch Crown meter.

Stock at Fresh Pond.

2 sledge hammers.
28 shovels.
25 picks.
2 axes.
2 paving hammers.
2 saws.
1 hatchet.
4 rakes.
2 levels.
3 pails.
2 chains.
4 iron bars.
4 grub hoes.
3 plows.
1 gravel scraper.
16 old wheelbarrows.
2 chests.
1 lantern.
3 gate wrenches.
900 railroad ties.
6,000 feet old plank.
Lot of sheet piling.
1 gravel screen.
1 drag.
6 lengths 30-inch pipe.
1 length 4-inch pipe.
1 row boat and oars.

REPORT

OF THE

ENGINEER OF THE PUMPING STATION.

Pumping Station,
Cambridge Water Works,
December 1, 1887.

Hiram Nevons, Esq., Superintendent: —

Sir: I would report the machinery at the pumping station in good condition. Engine No. 2 has had new steam valve stems put in. The old boilers have been altered to conform to the new ones put in last year. The main steam pipe has had new joints made and has been covered with Fossil meal composition, the lagging repaired and oiled. A Flinn mercurial damper regulator has been attached to the boilers and has given perfect satisfaction.

The auxiliary pumps have been in operation nearly the whole year, only being stopped from May 2 to 17. Following will be found a statement of the expenses at the pumping stations, with the usual tables.

EDWIN C. BROOKS,
Engineer.

STATEMENT.

$350\frac{1700}{2240}$ tons Cumberland coal at $4.18	$1,466 17
$505\frac{2100}{2240}$ tons Cumberland coal at $4.75	2,403 20
$114\frac{1040}{2240}$ tons Cumberland coal at $4.65	553 02
Amount brought forward	**$4,422 89**

Amount brought forward	$4,422 39
Oil, waste, packing, etc.,	209 62
Repairs on engines and boilers	147 84
Repairs on buildings and care of grounds	501 08
Tools, instruments and furniture	236 20
Gas	142 40
Salaries	4,057 00
	$9,716 53

Statement of expenses at auxiliary pumping station :

460$\frac{1510}{2240}$ tons Cumberland coal at $4.49	$2,068 43
5 tons furnace coal at $6.00	30 00
Oil, waste, packing, etc.,	100 00
Repairs on building and fire protection	100 21
Salaries	2,190 00
Repairs on engines and boilers	205 62
	$4,694 26

Engine Record, Pond Levels and Rainfall.

DATE.	LOW-SERVICE ENGINES.						HIGH-SERVICE ENGINE.						Total water pumped.	Daily average water pumped.	Total coal consumed.	Daily average coal consumed.	Av'age height of pond.	Rainfall.
	Total pumping time.		Daily average pumping Time.		Total water pumped.	Daily average water pumped.	Total pumping time.		Daily average pumping Time.		Total water pumped.	Daily average water pumped.						
	Hrs.	Min.	Hrs.	Min	Gallons.	Gallons.	Hrs.	Min.	Hrs.	Min.	Gallons.	Gallons.	Gallons.	Gallons.	Lbs	Lbs.	Feet.	Inches.
December, 1886..	442	20	14	16	104,088,000	3,357,677	442	20	14	16	8,718,970	281,257	112,806,970	3,638,935	171,600	5,535	6.48	5.23
January, 1887....	507	45	16	23	120,652,500	3,892,016	507	45	16	23	10,275,917	331,481	130,928,417	4,223,497	188,800	6,090	6.05	5.28
February, 1887..	426	55	15	15	101,689,200	3,631,757	426	55	15	15	8,284,877	295,888	109,974,077	3,891,645	158,300	5,654	6.90	4.66
March, 1887.....	442	45	14	17	105,233,700	3,394,636	442	45	14	17	8,956,589	288,922	114,190,289	3,683,558	184,000	5,936	7.33	4.46
April, 1887.......	403	35	13	27	92,584,500	3,086,150	403	35	13	27	7,776,806	259,227	100,361,306	3,345,376	166,900	5,563	7.81	3.94
May, 1887........	476	50	15	23	114,590,700	3,696,474	476	50	15	23	10,106,419	326,014	124,697,119	4,022,488	200,400	6,465	7.55	1.79
June, 1887.......	485	30	16	11	117,181,200	3,906,040	485	30	16	11	10,908,154	363,605	128,089,354	4,269.645	198,400	6,613	6.65	1.86
July, 1887........	489	10	15	47	121,160,700	3,908,410	489	10	15	47	11,591,155	373,908	132,751,855	4,282,318	197,600	6,374	5.24	4.19
August, 1887.....	442	50	14	17	108,733,200	3,507,523	442	50	14	17	11,709,658	377,731	120,442,858	3,885,254	180,700	5,829	4.17	4.10
September, 1887.	419	25	13	59	101,976,300	3,399,210	419	25	13	59	10,958,842	365,295	112,935,142	3,764,505	177,600	5,920	4.12	1.36
October, 1887....	444	35	14	25	104,751,000	3,379,065	444	35	14	25	11,545,190	372,425	116,296,190	3,751,490	188,700	6,087	4.19	3.22
November, 1887..	406	20	13	33	95,439,600	3,181,320	406	20	13	33	10,497,754	349,925	105,937,354	3,531,245	172,400	5,745	4.80	3.90
Total	5,388	00			1,288,080,600		5,388				121,330,331		1,409,410,931		2,185,400			43.99
Daily Average..	14	46			3,528,988		14	46			332,412		3,861,400		5,987		5.94	

Stock on Hand December 1, 1887.

1,180 tons Cumberland coal, 41 gallons cylinder oil, 16 gallons engine oil, 4 gallons kerosene oil, 15 pounds tallow, 60 pounds cotton waste, 10 pounds rubber packing, 5 pounds empire packing, 16 pounds Winans packing, 6½ pounds square flax packing, 16 pounds flax packing, 14 pounds soap, 8 manhole gaskets, 8 9-in. rubber valves, 2 valve seats, 2 steam gauges, 80 fire-brick, 2 brooms, 5 files, 1 pound emery, 2 barrels brimstone, 300 pounds bolts and nuts, 1 pair plungers and rings for No. 2 engine, 1 lot iron pipe, 1 lot pipe fittings, 10 feet 24-inch flange pipe, 8 feet 9-inch flange pipe, 8 feet 6-inch flange pipe.

Tools, Furniture and Instruments.

1 18-inch x 10 ft. engine lathe, 2 lathe chucks, 6 lathe dogs, 18 lathe tools, 1 grindstone, 1 3-inch x 9-inch engine with shafting, belting, etc., 2 vises, 2 vise benches, 3 die plates and dies, 1 set pipe taps, 1 set hand taps, 2 pipe cutters, 14 pairs pipe tongs, 3 hand hammers, 1 copper hammer, 1 soft hammer, 20 cold chisels, 6 files, 1 hand bellows, 6 screw wrenches, 5 Stillson wrenches, 2 hack saws, 22 fork wrenches, 27 socket wrenches, 5 gate wrenches, 1 hydrant wrench, 2 clamp screws, 2 sledges, 2 ratchets, 24 drills, 1 breast drill, 2 jack-screws, 6 steel bars, 2 soldering irons, 4 cylinder-head cranes, 12 eye bolts, 75 starting bolts, 1 chain fall, 3 tackles, 2 ladles, 6 wooden horses, 1 hand pump and 20 feet suction pipe, 4 rattan brooms, 1 oil cabinet, 1 set measures, 1 lot oil cans, 1 oil pump, 1 carpenter's bench, 4 planes, 3 hand saws, 8 chisels, 7 gouges, 2 screwdrivers, 2 bit-stocks, 13 bits, 3 augers, 1 draw-knife, 1 spokeshave, 1 axe, 1 hand axe, 2 hatchets, 2 squares, 1 set fire tools, 1 coal car, 1 pair platform scales, 2 wheelbarrows, 10 scoop shovels, 1 tube brush, 1 forge, 1 anvil, 5 pairs tongs, 2 hand chisels, 1 lawn mower, 2 steel rakes, 2 wooden rakes, 3 scythes, 4 forks, 1 weeder, 2 spades, 1 pick, 1 cast-iron roller, 6 ladders, 3 step-ladders, 200 ft. 2-inch hose and pipe, 50 ft. ¾-inch hose and pipe, 4 pairs rubber boots, 1 water cooler, 6 fire pails, 8 water pails, 1 watering pot, 1 window brush, 1 floor brush, 2 dust brushes, 1 feather duster, 1 dust-pan, 1 lot cocoa matting, 5 mats, 6 spittoons, 1 lot gas fixtures, 3

3 lanterns, 3 hand lamps, 1 desk, 2 tables, 14 chairs, 2 clocks, 1 barometer, 1 thermometer, 1 hygrophant, 2 rain gauges, 1 snow gauge.

Tools, Furniture, etc, at Auxiliary, Pumping Station.

1 12x20 portable engine and boiler, 1 12x20 stationary engine, 1 40 H. P locomotive boiler, 1 No. 2½ Blake pump, 1 12-inch centrifugal pump, 2 12-inch Follansbee propeller pumps, 1 lot shafting,, pulleys, and belting, 1 hand force pump, 100 ft. 1-inch fire hose and pipe, 80 ft. 1-inch rubber hose, 1 set fire tools, 4 oil cans, 1 belt awl, 1 belt punch, 1 belt clamp, 1 lot belt lacings, 4 bracket lamps, 2 lanterns, 1 large lantern, 1 stove and pipe, 1 cot bed and bedding, 1 ice chisel, 1 ice saw.

REPORT

OF THE

TRUSTEES OF THE SINKING FUND OF THE CAMBRIDGE WATER WORKS.

To the Honorable the City Council:—

THE undersigned, trustees of the Sinking Fund of the Cambridge Water Works, herewith submit their annual report of the fund committed by law to their charge:

Dr.

The amount of the fund at the last report, Nov. 30, 1886, was	$892,005 97	
Amount received from the City Treasurer of Cambridge, the same having been derived from the annual water rates, and being equal to three per cent on the amount of the outstanding Water bonds	51,465 00	
Amount received as interest on investments	37,840 72	
Amount received as premium on securities sold	5,608 80	
Amount received from the City Treasury, as surplus in the running accounts of the Water Works for 1887	1,676 52	
		$988,597 01

Cr.

Amount paid the Treasurer of Cambridge with which to meet the Water bonds maturing April 1, 1887	$150,000 00	
Amount of the fund Nov. 30, 1887, all securities taken at par	838,597 01	
		$988,597 01

The following is a list of securities belonging to the fund, Nov. 30, 1887: —

Cambridge Water Loan, six per cent bonds maturing April 1, 1888	$25,000 00
Amount carried forward	$25,000 00

Amount brought forward	$25,000 00	
Cambridge Water Loan, six per cent bonds, maturing May 1, 1889	8,000 00	
Cambridge Water Loan, six per cent bonds, maturing July 1, 1890	31,000 00	
Cambridge Water Loan, six per cent bonds, maturing May 1, 1891	26,000 00	
Cambridge Water Loan, six per cent bonds, maturing July 1, 1892	1,000 00	
Cambridge Water Loan, four per cent bonds, maturing Nov. 1, 1894	6,000 00	
Cambridge Water Loan, six per cent bonds, maturing April 1, 1895	37,000 00	
Cambridge Water Loan, 3½ per cent registered bond, maturing after April 1, 1896	100,000 00	
Cambridge Water Loan, 3½ per cent registered bond, maturing after July 1, 1896	75,000 00	
Cambridge Water Loan, six per cent bonds, maturing July 1, 1896	46,000 00	
Cambridge Water Loan, six per cent bonds, maturing July 1, 1897	16,000 00	
Cambridge Water Loan, five per cent registered bond, maturing July 1, 1898	12,500 00	
Cambridge Contingent Loan, four per cent note, dated Dec. 1, 1883	200,000 00	
		$583,500 00
Town of Southboro, four per cent bonds, maturing Mar. 25, 1888	$2,000 00	
Town of Southboro, four per cent bonds, maturing Mar. 25, 1890	6,000 00	
Town of Hyde Park, four per cent bonds, maturing July 1, 1891	5,000 00	
City of Salem, four per cent bonds, maturing July 1, 1892	17,000 00	
City of Fall River, four per cent bonds, maturing May 1, 1895	3,000 00	
Town of Arlington, five per cent bonds, maturing July 1, 1898	30,000 00	
City of Boston, four per cent bonds, maturing Jan. 1, 1899	50,000 00	
City of Boston, four per cent bonds, maturing April 1, 1900	4,000 00	
City of Fall River, four per cent bonds, maturing Aug. 1, 1900	13,000 00	
City of Cleveland, O., $3\frac{85}{100}$ per cent bonds, maturing Sept, 1, 1902	3,000 00	
City of Lawrence, four per cent bonds, maturing July 1, 1904	18,000 00	
City of Providence, five per cent bonds, maturing July 1, 1906	50,000 00	
Amounts carried forward	$201,000 00	$583,500 00

Amounts brought forward	$201,000 00	$583,500 00
Town of Winchester, four per cent bonds, maturing May 1, 1908	10,000 00	
Town of Beverly, four per cent bonds, maturing July 1, 1911	20,000 00	
		$231,000 00
		$814,500 00
Cash in First National Bank of Cambridge on interest		24,097 01
Total value of the fund, Nov. 30, 1887, all securities taken at par		$838,597 01

The bonded water debt which the foregoing fund is expected to pay, matures as follows, viz: —

April 1, 1888, six per cent coupon	$175,000 00
May 1, 1889, six per cent coupon	112,000 00
July 1, 1890, six per cent coupon	60,000 00
May 1, 1891, six per cent coupon	50,000 00
July 1, 1892, six per cent coupon	335,000 00
April 1, 1894, six per cent coupon	150,000 00
Nov. 1, 1894, four per cent coupon	36,000 00
April 1, 1895, six per cent coupon	160,000 00
April 1, 1896, 3½ per cent registered (or to April 1, 1911)	100,000 00
July 1, 1896, six per cent coupon	103,000 00
July 1, 1896, 3½ per cent registered (or to July 1, 1911)	75,000 00
July 1, 1897, six per cent coupon	16,000 00
July 1, 1898, five per cent registered	12,500 00
Nov. 1, 1906, 3½ per cent registered	43,000 00
Oct. 1, 1907, four per cent registered	75,000 00
Oct. 1, 1907, four per cent registered	15,000 00
Nov. 1, 1907, four per cent registered	20,000 00
May 1, 1910, four per cent registered	133,000 00
May 1, 1910, four per cent coupon	155,000 00
Total funded water debt	$1,825,500 00

There is nothing of special interest to report in addition to the foregoing figures. The $150,000.00 of water bonds, which matured April 1, 1887, have all been presented and paid, leaving the fund smaller by $53,408.96, than it was at the date of our last report. During the coming year a still further reduction will be made by the payment of $175,000.00 six per cent bonds maturing.

Respectfully submitted,

WM. E. RUSSELL,
JOHN H. CORCORAN,
WM. W. DALLINGER,
Trustees of the Sinking Fund of the Cambridge Water Works.

CAMBRIDGE, Dec. 1, 1887.

CITY OF CAMBRIDGE.

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THE

TWENTY-FOURTH ANNUAL REPORT

OF THE

CAMBRIDGE WATER BOARD

TO

THE CITY COUNCIL,

TOGETHER WITH THE

REPORTS OF THE REGISTRAR AND SUPERINTENDENT,
AND OTHER DOCUMENTS.

FOR THE YEAR 1888.

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☆ CAMBRIDGE PUB. LBRY

REPORT

OF THE

CAMBRIDGE WATER BOARD.

To the Honorable City Council of the City of Cambridge: —

THE Water Board herewith submits to you its twenty-fourth annual report, being for the year ending November 30th, 1888.

Total Cost of the Water Works.

Cost of the Water Works, November 30th, 1887, as per last year's report	$2,436,496 50
Expended during the year ending November 30th, 1888	103,283 50
Making the total expenditure	$2,539,780 00

Water Bond Account.

Whole amount of bonds issued	$2,439,900 00
Amount paid from the Sinking Fund . . .	716,400 00
Leaving unpaid Water Loan	$1,723,500 00
From this deduct the present value of the Sinking Fund for water debt, as per the Trustee's account	753,942 00
Leaving the Water Loan yet to be provided for by the Sinking Fund	$969,558 00

Statement in brief of the transactions in connection with the Water Works for the year ending November 30th, 1888.

General Construction Account.

RECEIVED.

From excess of rates, fines, etc	$24,256 84	
From sale of auxiliary engine and boiler	620 00	
		$24,876 84

EXPENDED.

Amount expended on general construction	$24,876 84

Stony Brook Construction Account.

RECEIVED.

Balance of appropriation of 1887	$51,070 92
From Water Bonds issued	25,000 00
Premium on the sale of the same	2,368 00
Sale of tickets to contractors, etc., Boston to Roberts'	9 00
	$78,447 92

EXPENDED.

On Stony Brook account	$63,006 09
Balance unexpended carried to new account	15,441 83
	$78,447 92

Fresh Pond Land Purchase, etc.

RECEIVED.

Balance of appropriation of 1887	$16,606 70
Sales of apples, etc.	62 65
	$16,669 35

EXPENDED.

For purchase of estates bordering on the Pond, examining titles, etc	$15,400 57
Balance unexpended carried to new account .	1,268 78
	$16,669 35

Water Rates, Fines and Supply Account.

RECEIVED.

From water rates	$213,159 00	
Less rates refunded . . .	2,002 73	
		$211,156 27
Shutting off and letting on water, Sealing, fines and rent .		654 95
From supply account . . .		6,149 67
Accrued interest on bonds sold		228 00
From construction account .		620 00
		$218,808 89

EXPENDED.

For general construction acc't	$24,876 84	
For maintenance account . .	41,951 32	
For supply account	5,216 31	
For interest on Water Loan .	89,765 00	
Paid into the Sinking Fund, being three per cent of $1,652,500	49,575 00	
Surplus of 1888 to the Sinking Fund	7,424 42	
		$218,808 89

Comparative Receipts.

Water-rates for the year ending Nov. 30th, 1888	$211,156 27
Water-rates for the year ending Nov. 30th, 1887	204,748 64
Showing excess of water-rates in 1888 . . .	$6,407 63

Water Supplied.

Amount of water pumped in 1888 . .	1,514,483,582 gallons
Amount of water pumped in 1887 . .	1,409,410,931 gallons
Showing an increase in 1888 of . . .	105,077,651 gallons

How the Water is Used.

Amount of water sold by meter . . .	325,877,500 gallons
Amount of water used in watering the streets	47,746,875 gallons
Amount used for domestic, fire, fountain and other purposes	1,140,864,207 gallons
Making the total gallons pumped . . .	1,514,488,582 gallons

Comparisons of Water Consumptions, etc.

Daily average pumping for the year for the high service in stand pipe . . .	345,473 gallons
Daily average pumping for the year for the low or reservoir service	3,792,474 gallons
Making daily average pumping this year	4,137,947 gallons

Daily increase in consumption of water 1886 over 1885 was	302,209 gallons
Daily increase in consumption of water 1887 over 1886 was	476,307 gallons
Daily increase in consumption of water 1888 over 1887 was	276,547 gallons

The falling-off this year in the daily consumption as compared with former years will be fully accounted for in the next statement we shall present to you, which will show the comparative rainfall for the past three years, this making a great difference in the use of water by hose, on gardens and lawns and for watering the streets.

Rainfall and Height of Water in the Pond.

MONTHS.	RAINFALL.			WATER IN THE POND BELOW HIGH-WATER MARK, 16.85.		
	1886.	1887.	1888.	1886.	1887.	1888.
	Inches.	Inches.	Inches.	Feet.	Feet.	Feet.
December	1.82	5.23	4.22	10.13	10.37	8.55
January	6.41	5.28	3.32	9.67	10.80	5.37
February	7.35	4.66	3.95	6.29	9.95	3.69
March	3.49	4.46	5.55	3.83	9.52	1.72
April	2.43	3.94	2.60	3.21	9.04	1.14
May	3.92	1 79	6.36	3.55	9.30	.81
June	1.48	1.86	3.25	4.31	10.20	1.12
July	3.54	4.19	2.87	5.45	11.61	2.39
August	3.20	4.10	7.08	6.40	12.68	3.75
September	4.64	1.36	8.28	7.59	12.73	3.24
October	3.62	3.22	4.83	8.87	12.66	1.37
November	4.22	3.90	7.70	9.62	12.05	1.25
Total for the year	46.12	43.99	60.01	6.58	10.91	2.87

By reference to the above table it will be seen that during the past year we have had the heaviest rainfall that we have had for many years, amounting to over sixty inches. We think this is unprecedented in the existence of our Water Works, and certainly we have never had the waters so high on the meadows below the Pond. At one time the water was so high that quite a large amount ran over the railroad track of the Boston Ice Company into the Pond. This was an experience we never had before, and immediate steps were taken to have the track raised, so as to prevent in the future a repetition of the same thing.

Stony Brook Water Supply.

When the water was formally introduced into Fresh Pond Nov. 5th, 1887, the water had fallen more than thirteen feet below high water mark, and nearly one-third of the bottom of the Pond was bare. The water was allowed to run in until we reached a point where we could pump at our Station without the use of the auxiliary pumps on the border of the Pond. It was then shut off for a while to accommodate the ice men, as the constant raising of the ice in the Pond broke away the ice from the shore and interfered with their business. Observations made during the filling up of the Pond showed that our conduit would deliver as much water daily as our engineers had estimated. After the ice cutting was over the gate was opened and the Pond allowed to fill up. The highest point was reached in May, when the Pond was nearly up to high water mark.

A correct account is kept daily of the height of water in the reservoir at Stony Brook, and the amount of water which runs to waste over the dam. This account shows that besides filling up Fresh Pond to start with, which required about 700,000,000 gallons of water, and a large amount wasted through our 36-inch blow-off last spring during a freshet to relieve Roberts' Mill from danger, and supply all that we needed for consumption in Cambridge, there was still more than 6,000,000,000 gallons of water that ran over our dam to Roberts' Mill, and thence to Charles River. This is four times as much water that ran to waste over our dam as all our consumption this year.

Quality of the Water, etc.

The quality of the water has proved to be excellent, and by the analysis made semi-monthly by the State Board of Health, it is constantly improving in softness and purity. So far all our expectations from this source of water supply have been fulfilled, and nothing new has been developed to change our conviction that Cambridge has secured an ample supply of good water for many years to come.

Rights in Fresh Pond.

By the Act of the Legislature herein referred to it was provided "in order that the said City of Cambridge may better guard and protect the waters to be stored, distributed and used in said reservoir and storage basin from pollution and intrusion, all the right and control which the Commonwealth has in the great pond known as Fresh Pond in Cambridge is hereby granted and relinquished unto said city, said grant and relinquishment to take effect whenever said city shall by purchase or otherwise become the owner of all the land abutting on said Pond." We consider this a very valuable grant from the Commonwealth to the City of Cambridge, and it ought to be secured at an early day. There is no land now abutting on the Pond that does not belong to the City, except about five hundred feet that belongs to the Fresh Pond Ice Company.

Fresh Pond Ice for Cambridge.

Some of our citizens think it is important that we should have pure ice as well as pure water, and would like to get their ice from Fresh Pond if it were practicable. In our negotiations with the Fresh Pond Ice Company we found them willing to enter into an arrangement to sell the city a strip of land, say 100 feet wide, on the border of the Pond for a driveway and move back their buildings, provided they could have a canal cut across the driveway to float their ice through in the winter, and at the same time be secured by the city the right to cut ice on Fresh Pond for the years to come to supply the people of Cambridge. At this stage of the negotiations it was found that the City did not have the legal right to make such an arrangement, and that further legislation would have to be secured before it could be done. We think, however, if any plan is adopted, the best way would be for the city to take the property of the company, and negotiate about doing the business afterwards and providing such regulations and protection for our people as may be found best. By the taking, also, sundry conditions, restrictions, and rights of way, now attached to the property of the Fresh Pond Ice Company, would vest in the city, and relieve its other property.

Land Taken around Fresh Pond.

In response to the petition of the City Council last winter, by an Act of the Legislature, the City of Cambridge was authorized to take by purchase or otherwise, all the land around Fresh

Pond for the purpose of protecting the purity of the water, and preparing and using Fresh Pond as a storage reservoir in connection with the Stony Brook supply. Under the authority of the City Council, who acted under the authority of the Legislature, the Water Board have taken by purchase from the Middlesex Savings Institution a large tract of land bordering on the Pond on the southwest side, containing about twenty acres, for the sum of $15,000. This tract had a large length bordering on the Pond, and covers the ground formerly occupied by ice houses. A portion of the land is low, and will have to be graded up to prevent it becoming objectionable. We have also taken under the right of eminent domain granted by the Act, all the estate of Dr. Somers lying between Fresh Pond and Concord Avenue; also a small lot adjoining the right of way of the City from Concord Avenue to the gravel pit; we have also taken the whole of Mrs. Gay's estate, and all of the land and buildings of the Boston Ice Company, formerly Tudor's. In all these takings we tried to procure them by purchase, but were unable to agree with the parties on a price. All our takings have been submitted to the City Council for their approval before they were recorded, and were by them approved and ratified, and an attested copy of their action has been recorded with and as a part of the taking by the city.

Land Damages.

During the year nine suits for land taken by the Water Board, on the route to Stony Brook, and about the Stony Brook reservoir have been settled and paid, all of them on the basis of the award of the Commissioners, who were appointed by the Court, under authority of the Act of the Legislature by which the land was taken. There are some other cases still pending before the Commissioners.

Water Damages.

An award was made by the Commissioners in the Roberts case, covering the water power and the land which we have flowed and taken in connection with our dam. While the award, as we believe, more than covers all his damage, yet he was not satisfied, and has taken an appeal to a jury. No other water cases have been acted upon as yet by the Commissioners.

A recent decision of the Supreme Court of Massachusetts we hail as an important step in the right direction in regard to water supplies, by which it was decided that the Commonwealth had a right to give the water which belonged to it to the people for domestic uses, without their being liable to pay damages to those who had long used it for mechanical and mercenary purposes. We think this decision must have a favorable effect on all our cases that may come before a court and jury.

Work Done around the Pond.

During the year a guard fence has been built around that part of the Pond owned and controlled by the City. A driveway and entrance has been made leading from the Pond to Concord Avenue, and considerable filling into the works outside of our roadway has been done. On the south side the bank was dug away sufficient to make the driveway thirty feet wide ; a retaining wall was then built about one thousand feet long to hold the bank, and above the wall the bank has been graded, loamed and sodded, the sods being pinned in the most thorough manner. This makes a finish of this part of the borders of the Pond, and in connection with the natural and beautiful grove above the bank is one of the most attractive places in our City as a summer resort. When our roadway is completed all around the Pond, which must come soon, the nearly three-mile drive around our Fresh Pond reservoir will be one of the pleasantest to be found in the vicinity of Boston. A fence has been built on the south and west side of the property of the city bordering on Fresh Pond.

Fresh Pond Drive.

There is one thing that seriously interferes with the pleasure of the drive around our Storage Basin, and that is the intolerable stench that comes from the Niles hog-slaughtering establishment near Concord Avenue, and not far from our Fresh Pond. At times this extends to the high land on Arlington Street where are some of the finest houses in the city, and again the effluvia sweeps across the Pond over to Brattle Street, creating a nusiance in all the region around. We think this nuisance should be abated forthwith.

Work at the Engine House.

It was found that in warm, dry weather in the summer, and in extreme cold weather in the winter, our five million gallon pump could not supply the consumption during the day, and it was necessary to use both of the pumps at the same time. This left us without the necessary duplicate pumping power to provide against accidents. It was found that since we had provided a separate pump for the high service, that the steam power of our pumps was sufficient to carry double their present capacity into the reservoir. After careful consideration it was decided to double the capacity of the water end of one of our pumps. Plans were made and estimates received for making all necessary changes. The work was awarded to the Geo. F. Blake Manufacturing Company, they being the lowest bidders. The changes have been completed, and the pump is now doing a ten million gallon daily work, apparently as easily as it formerly did half as much. As the cost of making this change has been only about one-third that a new ten million gallon pump would cost, the economy of the change will be readily seen. We think that the other pump should be treated in the same way the coming season and put in the most thorough repair. We shall then have ample duplicate pumping power for many years to come, a thing which no city of the size of Cambridge, depending on machinery for its water supply, should be without.

Work to be Done.

We recommend that the following work be done the ensuing year, and at the proper time we shall ask you to grant the needed appropriations to enable us to do the same.

First. To construct a drain that will carry away the surplus water coming from Richardson's Pond, and that part of Belmont near there, from Fresh Pond down into Alewife Brook through some of its tributaries. At present this water gathers on the low lands southwest of the Pond, and from there runs over into the Pond when the lowlands are flooded. At present there is no other place where it can go. We should have done something about this matter last fall, but the water was so high on the meadows that it was impracticable. As soon as this drain is put in the water can be kept as low as the water on the meadows and never again run into our water supply.

Second. The other pumping engine should be changed to correspond with the one that has been altered the past year, a separate condenser should be provided for the high service pump so that it can be run independent of the large pumps and thus make a saving in fuel while all necessary work is being done. The introduction of a small dynamo to light our pumping station by electricity can be done at an expense of about four times what it costs us now per annum for gas, and it would give us better service at greatly reduced cost. We have the steam power and the shafting all ready to belt on to the electric machine.

Third. Our reservoir walls which have been so long neglected should be rebuilt and strengthened in order that they may be perfectly safe against accident. Every year shows signs that this matter ought not to be longer neglected. In connection with rebuilding the walls a chronograph house should be built near the stand-pipe, which can be kept warm in the winter and protect this important agency in helping us detect leaks and waste of water.

Fourth. As soon as the ice freezes so that we can work on it we intend to move the auxiliary pumping house on the border of the Pond for which we have no further use, and recommend that from the material a storage building be made, which we need in the neighborhood of our pumping station. The cost will be small and it will be a great convenience.

Fifth. As much work as can be reasonably done in one year should be done towards filling the low grounds and nook about the Pond up to grade seventeen. By filling back from our roadway and widening the space between the Pond and the low places, gradually we shall accomplish the whole work. We have the material on our own ground and very convenient. Whatever we can do in this direction will be all labor for Cambridge men and teams. None of the money thus expended will go out of the city, but will go to that class of our citizens who need it most. We would recommend liberal appropriations for this work that it may be done as fast as possible.

Remarks.

As will be seen by what we have stated under the head of "Work to be done," the Water Board will need the use of all resources for the next few years to complete the work so well begun in connection with Fresh Pond as our permanent storage basin and reservoir. In this connection we will call attention to Section 25 of the Water Ordinance, which reads, "For water used by the city an account shall be made and the amount thereof shall be charged to the proper appropriations and credited to the Water Works."

This seems to us just, and is in accordance with the usages and customs of other cities, and should be carried out in Cambridge as well as elsewhere in order that we may make a fair showing of our success when compared with others on the same basis. Three years ago we were requested to abate the charge on hydrants, so that the tax rate might be brought within a certain figure, and the last two years we have been requested to abate all charges for hydrants, watering the streets and all city buildings. Of course these requests coming from the City Council, representing the people, whose servants we are, made any course except to comply with their requests seem disrespectful. But now in view of the large expenditures we ought to make to complete our work, we ask candidly and respectfully if the city ought not in justice to return to the practice set forth in its own ordinance, at least for a few years, and let the Water Board have the use of its own proper income until these extraordinary expenses are met and discharged.

We would also call attention to the large amount of gravel and sand that is being taken for the use of the street department, from land which the Water Board have purchased or taken. We think an account of this should be kept and the Water Department credited with its fair value in the bank and the same charged to the Street Department.

For the details of what has been done and the present condition of our Water Works we would refer you to the Report of the Registrar, the Superintendent and the Pumping Engineer, which we herewith transmit to you as a part of our report.

In closing we wish to testify to the cheerful assistance of the City Engineer and those under him in his office whenever we have needed their services, and we would speak a good word for our City Solicitor, who has been untiring in his efforts to protect the city's rights and secure a fair settlement of the many claims that have grown out of Stony Brook extension and other matters connected therewith, and also we would testify to the faithfulness of our Superintendent, who in season and out of season, night and day, has performed the duties devolved upon him with a single eye to the interests of the city. Our Registrar keeps his work well in hand, and his office and books are models of neatness and correctness. Few are aware of how many unpleasant and often unreasonable things this officer has to meet during a year, calling for the exercise of patience and forbearance and yet firmness in the discharge of his duty.

We would also express our appreciation of the work of our Pumping Engineer, who in addition to his regular work has taken the entire oversight of the changes made in our No. 2 pump, and we count ourselves fortunate in having a man in his place who knows just how all such work should be done.

Respectfully submitted,

C. W. KINGSLEY,
WM. E. RUSSELL,
JOHN F. O'BRIEN,
L. M. HANNUM,
K. S. CHAFFEE,
JAS. M. W. HALL,
ALVIN F. SORTWELL,

Cambridge Water Board.

REPORT

OF THE

WATER REGISTRAR.

WATER REGISTRAR'S OFFICE,
CAMBRIDGE, Dec. 7, 1888.

To the Cambridge Water Board: —

IN compliance with the requirements of the City Ordinance, I present the twenty-fourth annual report of the operations of this department, showing the receipts, expenditures and abatements, together with a statement of the number of water takers, fixtures, etc., for the year ending Nov. 30, 1888.

Amount of bills remaining unpaid, Nov. 30, 1887.

Water-rates	$262 30
Meter-rates	374 60
Supplies and repairs	857 73
Rent	30 00

Amount of bills placed in hands of City Treasurer for collection from Nov. 30, 1887, to Nov. 30, 1888: —

Water-rates	$170,310 18	
Meter-rates	46,376 65	
Supplies and repairs	6,758 76	
Off and on water, rent, seals, and fines	669 95	
Total bills		$225,649 17

There have been collected : —

Water-rates.		$213,159 00	
Off and on water, rent, seals, and fines		654 95	
Supplies and repairs		6,149 67	
Total collections		$219,963 62	

There have been abated : —

Water-rates		$3,842 78	
Supplies and repairs		33 65	

There remain unpaid : —

Water-rates	$132 45		
Meter-rates	198 50		
Supplies and repairs	1,433 17		
Rent	45 00		
		$1,809 12	
			$225,649 17

Expenditures.

Construction account (Stony Brook)		$63,006 09	
Construction account (Fresh Pond land purchase)		15,400 57	
Construction account (general)		24,876 84	

Maintenance account, viz : —

Care and repairs	$27,554 21		
Pumping service	10,855 99		
Office expenses	3,541 12		
		$41,951 32	
Supply and repair account		5,216 31	
Total			$150,451 13

Abatements.

Water-rate bills to the amount of	$3,482 78	
Supply and repair bills to the amount of	33 65	
Total		$3,876 43

Refunds.

Water-rates to the amount of	$2,002 73	
Which amount deducted from receipts	213,159 00	
Leaves net receipts for water	$211,156 27	
Add off and on water, rent, seals, and fines	654 95	
Makes net receipts of rates, fines, etc..		$211,811 22

Off and On.

Water has been shut off for non-payment of rates, or per order on account of vacancy, and seals have been applied to fixtures by request of owners or occupants as follows: —

Supplies shut off in 1888	473
Supplies let on, shut off in 1888	346
Supplies let on, shut off in previous years	65
New supplies let on	308
Seal-locks applied to fixtures in 1888	572
Seal-locks removed, put on in 1888	202
Seal-locks removed, put on in previous years	137

Statement of the yearly revenue received from water-rates since the purchase of the Works by the city: —

From	April 28, 1865,	to Dec.	1, 1865	$32,367 19
"	Dec. 1, 1865,	"	1, 1866	40,073 27
"	" 1, 1866,	"	1, 1867	52,733 62
"	" 1, 1867,	"	1, 1868	63,747 42
"	" 1, 1868,	"	1, 1869	76,149 30
"	" 1, 1869,	"	1, 1070	92,606 95
"	" 1, 1070,	"	1, 1871	111,782 65
"	" 1, 1871,	"	1, 1872	127,201 30
"	" 1, 1872,	"	1, 1873	146,117 32
"	" 1, 1873,	"	1, 1874	153,634 27
"	" 1, 1874,	"	1, 1875	138,880 37
"	" 1, 1875,	"	1, 1876	179,166 76
"	" 1, 1876,	"	1, 1877	154,843 59
"	" 1, 1877,	"	1, 1878	157,443 91
"	" 1, 1878,	"	1, 1879	164,681 90
"	" 1, 1879,	"	1, 1880	173,325 49
"	" 1, 1880,	"	1, 1881	170,062 73
"	" 1, 1881,	"	1, 1882	177,430 80
"	" 1, 1882,	"	1, 1883	179,361 89
"	" 1, 1883,	"	1, 1884 (10 months)	161,526 27
"	" 1, 1884,	"	1, 1885	185,544 36
"	" 1, 1885,	"	1, 1886	199,404 43
"	" 1, 1886,	"	1, 1887	204,748 64
"	" 1, 1887,	"	1, 1888	211,156 27

The water works now receive no revenue for water furnished for city uses. In 1887, by request of the City Council, the water-rate charges for fire hydrants, school-houses, public buildings, etc., were abated. In 1888, in addition to these abatements, the charges for water used for watering streets were also abated, making a total abatement of about $16,000.00, or seven per cent of the whole amount of water-rates charged in 1888.

Comparative Statement.

	1887.		1888.	
Construction Account (Stony Brook).				
RECEIVED.				
From bonds issued (par value), additional appropriation by City Council	$68,100 00		$25,000 00	
From premium on bonds	812 50		2,368 00	
Allowance made by R. D. Wood & Co. for cracked and light pipe	287 22			
Sale of tickets, "Boston and Roberts"	42 00		11 00	
Balance of appropriation	93,192 46	$162,434 18	51,070 92	$78,447 92
EXPENDED.				
Sundry bills	$111,363 26		$63,006 09	
Balance of appropriation	51,070 92	$162,434 18	15,441 83	$78,447 92
Construction Account (Fresh Pond Land Purchase).				
RECEIVED.				
Balance of appropriation	$28,020 20		$16,606 70	
From premium on bonds	112 50			
Sale of apples, etc.			62 65	
		$28,132 70		$16,669 35
EXPENDED.				
Purchase of sundry estates, etc.	$11,526 00		$15,400 57	
Balance of appropriation	16,606 70	$28,132 70	1,268 78	$16,669 35
Construction Account (General).				
RECEIVED.				
From excess of receipts from "Rates, fines, etc."	$19,556 35		$24,256 84	
Refund of overcharge	7 50			
Town of Belmont (grading on Cushing St.			20 00	
Sale of auxiliary boiler and pump			600 00	
		$19,563 85		$24,876 84
EXPENDED.				
Sundry bills		$19,563 85		$24,876 84
Maintenance Account.				
RECEIVED.				
Accrued interest on Water Bonds	$172 22		$228 00	
Sale of horse	100 00			
American Rubber Company	751 69			
Duplication of names on pay-roll—amount covered back into treasury	9 50			
From "Rates, fines, etc."	205,205 14	$206,238 55	$211,811 22	$212,039 22
EXPENDED.				
Care and repairs	$37,610 62		$41,951 32	
Interest on Water Debt	97,355 00		89,765 00	
Paid to Sinking Fund Commissioners	51,465 00	$186,430 62	49,575 00	$181,291 32
Excess of receipts		$19,807 93		$30,747 90
Supply Account.				
Received		$6,138 99		$6,149 67
Expended		4,714 05		5,216 31
Excess of receipts		$1,424 94		$933 36

1887.	Maintenance Account, excess of receipts	$19,807 93
	Supply Account, excess of receipts	1,424 94
	Excess of total receipts over total expenditures	$21,232 87
	Expended on Construction Account (general)	19,556 35
	Balance due Sinking Fund	$1,676 52
1888.	Maintenance Account, excess of receipts	$30,747 90
	Supply Account, excess of receipts	933 36
	Excess of total receipts over total expenditures	$31,681 26
	Expended on Construction Account (general)	24,256 84
	Balance due Sinking Fnnd	$7,424 42

The excess of receipts for 1888, as shown in the above comparative statement, amounting to $7,424.42, has been carried to the Sinking Fund, as required by law.

Besides the manufactories, etc., supplied by meter, water is supplied to 14,379 families, 907 stables, with 2,655 horses, and 262 cows, 260 shops, 498 offices and stores, by the following fixtures, viz : —

17,360 faucets,
4,691 wash-basins,
3,434 wash-tubs,
2,772 bath-tubs,
828 slop-closets,
8,073 pan-closets,
9 hopper-closets,
93 urinals,
37 yard hydrants,
4 fountains,
4 tumbler-washers,
1,289 hand-hose,

Also,

617 fire-hydrants (beside 16 on private premises).
7 fire-reservoirs,
15 drinking-fountains in public squares.

The above is exclusive of the school-houses, engine-houses, police stations, and other city buildings.

The usual house-to-house inspection has been made, and considerable waste of water discovered and stopped, as well as many charges and collections made of water-rates for fractional parts of the year.

Respectfully submitted,
WALTER H. HARDING,
Registrar.

REPORT

OF THE

COMMITTEE ON ACCOUNTS OF THE CAMBRIDGE WATER BOARD.

We have examined the abstract of accounts as presented to us by the Water Registrar, covering the records of the past year. We have compared it with the statements submitted to us by the City Treasurer and Auditor, and we find them to be correct and in agreement. Annexed is the financial statement presented to us by the Water Registrar, and verified by us:—

Amount of bills in hands of City Treasurer, November 30, 1887:—		
For water rates and rent	$666 90	
For supplies and repairs	857 73	$1,524 63
Amount of bills delivered to the City Treasurer, for collection during the year ending Nov. 30, 1888:—		
For water rates	170,319 18	
For meter rates	46,376 65	
For supplies and repairs	6,758 76	
For off and on, rent and seals	669 95	
		$224,124 54
Total bills		225,649 17
There have been abated	3,876 43	
There have been refunded	2,002 73	
		5,879 16
		$219,770 01
There have been collected	$219,963 62	
Balance uncollected Nov. 30, 1888	1,809 12	
	$221,772 74	
Less refunded as above	2,002 73	
		$219,770 01

JAS. M. W. HALL, } *Committee*
ALVIN F. SORTWELL, } *on Accounts.*

CAMBRIDGE, December 1, 1888.

CITY OF CAMBRIDGE,
OFFICE OF CITY TREASURER,
December 1, 1888.

To the Cambridge Water Board :—

GENTLEMEN: I give you herewith a record of the transactions between the Water Officer and the City Treasurer's office during the year ending November 30, 1888.

Gross collections for account of water works, rates, fines etc.	$217,656 73
Abatement certificates received from Registrar for account of water rates	3,842 78
Gross collections for account of Water Works supply account were	6,183 32
Abatement certificates received from Registrar for supply account	33 65
Refund checks have been paid amounting to	2,002 73
Uncollected bills in my hands November 30, 1888, for water rate account	330 95
Uncollected bills in my hands November 30, 1888, for rent account	45 00
Uncollected bills in my hands November 30, 1888, for supply account	1,433 17

Respectfully,
WILLIAM W. DALLINGER,
City Treasurer.

CITY OF CAMBRIDGE,
OFFICE OF AUDITOR OF ACCOUNTS.
December 1st, 1888.

To the Committee on Accounts of the Cambridge Water Board :—

GENTLEMEN: In accordance with your request I herewith present a statement from my books for the year ending November 30, 1888.

WATER WORKS (RATES, FINES, ETC.).

Amount of uncollected bills in City Treasurer's hands December 1st, 1887	$666 90
Amount of bills placed in City Treasurer's hands for collection	$217,365 78
Total	$218,032 68
Amount carried forward	$218,032 68

Amount brought forward		$218,032 68
Amount collected by City Treasurer		217,656 73
Balance uncollected		$375 95
Amount of abatements allowed by City Treasurer	$3,842 78	
Amount of refunds paid by City Treasurer	2,002 73	

WATER WORKS (SUPPLIES).

Amount of uncollected bills in City Treasurer's hands Dec. 1st, 1887		$857 73
Amount of bills placed in City Treasurer's hands for collection		6,758 76
Total		$7,616 49
Amount collected by City Treasurer		6,183 32
Balance uncollected		$1,433 17
Amount of abatements allowed by the City Treasurer	$33 65	

Respectfully submitted,

HARRY T. UPHAM,
Auditor of Accounts.

ANNUAL STATEMENT OF THE WATER REGISTRAR TO THE COMMITTEE ON ACCOUNTS, DECEMBER 1, 1888.

Water-rates unpaid Nov. 30, 1887		$666 90	
Bills placed in hands of City Treasurer for collection from Dec. 1, 1887, to Nov. 30, 1888:—			
Water-rates from annual ledgers	$159,665 20		
Water-rates, from fractional ledger,	10,653 98		
Water-rates, from meter ledger	46,376 65		
Off and on water	369 45		
Rent	194 00		
Seals	106 50		
		$217,365 78	
Total bills on rates, fines, etc.		218,032 68	
Supply and repair bills unpaid Nov. 30, 1887	$857 73		
Supply and repair bills placed in hands of City Treasurer for collection from Dec. 1, 1887, to Nov. 30, 1888	6,758 76		
		$7,616 49	
Total bills			$225,649 17

There has been collected, annual ledgers	$157,427 60		
There has been collected, fractional ledger	9,466 68		
There has been collected, meter ledger	46,264 72		
There has been collected, off and on water	369 45		
There has been collected, rent . .	179 00		
There has been collected, seals . .	106 50		
Total collections, on rates, fines, etc.		$213,813 95	
Collections on supply and repair accounts		6,149 67	
Total collections		219,963 62	
There have been abated, water-rates	3,842 78		
There have been abated, supplies and repairs	33 65	$3,876 43	
There remain uncollected water-rates	330 95		
There remain uncollected supplies and repairs	1,433 17		
There remain uncollected rent . .	45 00	1,809 12	
			$225,649 17

Total collections, rates, fines, etc. .	213,813 95
Less refunds	2,002 73
Net receipts from rates, fines, etc.	$211,811 22

Attest: WALTER H. HARDING,
Registrar.

REPORT

OF THE

SUPERINTENDENT OF THE WATER WORKS.

CAMBRIDGE, NOV. 30, 1887.

To the President and Members of the Cambridge Water Board :—

GENTLEMEN : I herewith present the annual report of the Superintendent upon the condition of the works and the operations of the past year.

The total amount of water pumped was 1,514,488,582 gallons. Coal consumed per million gallons pumped, $1{,}552\frac{67}{100}$ pounds.

Water sold by meter and that used for watering streets, 373,624,375 gallons ; leaving as the amount for domestic use 1,140,864,207 gallons.

Number of gallons daily for each inhabitant on the whole amount pumped, $59\frac{11}{100}$ gallons.

Number of gallons daily for each inhabitant on amount for domestic use, $44\frac{53}{100}$ gallons.

Stony Brook Works.

Water has been drawn into Fresh Pond from Stony Brook intermittently, when flowing over the dam, until the pond was full. For nearly two months water has continued flowing over the dam to a large amount.

Thomas Bowman was appointed keeper of the works in December, and during the winter occupied with his family the building put up for the use of the resident engineers during construction. This building has been moved to a position parallel with Summer Street, and rebuilt into a dwelling-house. A cellar has been put under it, a shed and stable built, and the lot fenced from South Street Bridge to the reservoir lot; the whole making a very neat appearance in connection with the surroundings. At this date an iron fence is being put up around the gate-house and across the bridge.

Four of the screens in the screen-room were broken and new ones made with coarser mesh. The accident occurred during a heavy storm last spring, while the 36-in. blow-off was opened: the screens became clogged and finally broke.

Fresh Pond.

The average height of the water in Fresh Pond has been 13.98. The fountain has been run whenever the water was flowing over the dam at Stony Brook. It is very desirable that Fresh Pond should be kept full by running the fountain continually, regulating the discharge by the gate to correspond to the draught from the pond and have the fluctuation in the height of water at the Stony Brook basin.

The roadway from Concord Avenue, running parallel with the Fitchburg Railroad to Fresh Pond Lane, has been graded and put in good condition. Kingsley Park and the extension of Tudor Park on Concord Avenue, have been covered with loam, and seeded down. The Holworthy Street cut has been graded, the gutters paved and banks sodded. The gutters on the roadway, from the gate-house east to near the Fitchburg R. R., and west to the retaining wall, have been paved. The roadway on the South Shore at the high bluff has been widened to 30 feet, about 1,000 feet length of retaining wall built at the foot of the bank, and banks have been graded and sodded from the gatehouse to near Cushing Street.

45,000 square feet of sods were laid on this bank and 17,500 square feet at the Holworthy Street cut. A drain has been made on the Cushing Street hill to convey the water away and prevent washing over the banks. 236 feet of 10-inch Akron pipe was laid and the remainder is an open ditch. The roadway through the old gravel pit to Concord Avenue has been completed.

From the overflow gate-house, near the Boston Ice Co. icehouse, around the basin to the Fresh Pond Ice Co. premises, a distance of 11,680 feet, a substantial fence has been built of red cedar posts, cypress rail and hub-guard plank, painted two coats, and the rail also sanded. A picket fence has been built across Holworthy Street hill from the Fitchburg R. R., to Cushing Street, on Cushing Street to the Artemus White estate, thence to Adams Street, at the Gay estate, 5,160 feet in length. Also 370 feet of three-rail fence on Concord Avenue, from the Boston Ice Co. premises to the branch track of the Fitchburg R. R., making the total length of new fence 3.26 miles.

Black's Nook dam has been widened and the roadway graded across the dam and along the North Shore to the Boston Ice Co. premises. An open ditch has been dug through land formerly belonging to the Black estate, connecting with the Little Pond conduit at a point near Concord Avenue, for the purpose of conveying the water from the unfilled portion of Black's Nook and from behind the dams on the south side of Fresh Pond, to the meadows back of Niles' slaughter-house. Only the connection on the Black estate has yet been made.

The water on the meadows at the main track of the Fitchburg R. R. being 10½ inches higher on the south side than on the north, an arrangement was made with the railroad company for the City to furnish four 30-inch pipes and the company to lay them as a culvert at the junction with the ice track. When this is done and proper connections made with the conduit the water behind the dams and in Black's Nook will be kept drawn down to grade 13.00 and 14.00.

The auxiliary pumping house should be removed, as it will only be used as a storehouse, for which purpose the location is objectionable. The stable, on what was formerly the Somers estate, should also be moved to near the Boston Ice Co. premises, on Concord Avenue, to be used for storage. The Atlas engine and boiler have been sold, together with the shafting, leaving only the centrifugal and Follansbee pumps and the Kendall & Roberts portable engine to be sold or stored when the old pump house is removed.

Pumping Works.

A new pump end of a capacity of ten million gallons has been set up by the George F. Blake Manufacturing Co., in place of the No. 2 five million Worthington pump end removed, as more fully stated in the Engineer's report, and I fully endorse the recommendations contained in said report. Slight repairs have been made on the tin roof of the engine-house and new supports put under the coal track in the coal shed. The grounds and Tudor Park have received the necessary care.

Reservoirs.

New steps have been built leading from the street to the standpipe and the brick work around valve chamber repaired. A slight settlement in the bank was observed at the southeast corner of the reservoir about 2 feet below the top. Although the bank was quite soft it was probably due to surface water. Since being repaired no further indication of settlement or any signs of leakage have been discovered. The reservoirs should be thoroughly repaired as soon as spring opens. A new division fence has been built on the east side of the lot from Highland Street to the Reed estate.

High Service.

No extensions have been made on this system during the year. It continues to give perfect satisfaction.

Stony Brook Pipe Line.

A leak was discovered on this line near the gate-house in the Holworthy Street cut. It was traced to the old pond at the head of the cut where the pipe settled last year. Four joints were found slightly drawn towards the pond. At Loafer's Bridge in Waltham a leak was caused by a building mover who drove a spike through the pipe. The ground was frozen very hard, covering the pipe 12 inches and the spike made a clean hole, of about ½ inch diameter, without cracking the pipe. This leak was repaired by plugging. All the air valves were opened this fall without finding air in any of them.

Pipe Yard.

Slight repairs have been made on the roof of the stable and a new gate made to the yard. The buildings are in good condition, but will need painting another year.

Brookline Street Pipe Bridge.

Owing to the rotting of the sills of the house, the sheathing was being washed off by the action of the water on the east side. Repairs were made by putting on two courses of spruce plank thoroughly spiked.

Accompanying this report is that of the Engineer at the pumping station and the following tables show the location of meters, fountains and standpipes, the details of main and supply extension, and the account of stock on hand.

Respectfully submitted,
HIRAM NEVONS,
Superintendent.

Main Pipe.

Main pipes have been laid in the following streets: 3 ft. of 1½-in. and 581½ ft. of 6-in. in Albro St., 60 ft. of 6-in. in Avon Hill St., 15 ft. of 6-in. in Cambridge St. at Dailey Alley, 3 ft. of 1½-inch, and 119½ ft. of 4-inch in Carlisle St., 192 ft. of 4-in. in Carver St., 5½ ft. of 6-in. in Cedar and Dudley Sts., 33 ft., of 6-in. in Central Square, 3 ft. of 1½ in. and 112 ft. of 4-in. in Clarke St., 84 ft., of 6-in. in Clifton St., 52 ft. of 4-in. in Cottage Court, 3 ft. of 1½-in. and 564 ft. of 6-in. in Creighton St., 3 ft. of 1½-in. and 196 ft. of 4-in. in Cushing Court, 134 ft. of 4-in. in Douglass St., 3 ft. of 6-in. in Erie St., 3 ft. of 1½-in. and 152 ft. of 4-in. in Fiske Ave., 511½ ft. of 6-in. in Gray St., 3½ ft. of 1½ in. and 192 ft. of 4-in. in Grigg St., 800 ft. of 4-in. and 5 ft. of 6-in. in Hammond St., 3 ft. of 1½-in. and 135 ft. of 4-in. in Harold Pl., 8 ft. of 6-in. in Harvard St., near Dana St., 99½ ft. of 4-in. in Hews St., 3 ft. of 1½-in. and 147 ft. of 4-in. in Huron St., 43 ft. of 6-in. in Irving St., near Cambridge St., 333 ft. of 6-in. in Lambert Avenue, 193 ft. of 6-in. in Magazine St., 7 ft. of 6-in. in Main and Douglass Sts., 7 ft. of 6-in. in Main and Essex Sts., 7 ft. of 6-in. in Main and Norfolk Sts., 9 ft. of 6-in. in Mt. Auburn and McDonald Sts., 141 ft. of 8-in pipe in Ninth St., 3 ft. of 8-in. in Ninth and Potter Sts., 3 ft. of 1½-in. and 110 ft. of 6-in. in Pemberton St., 104 ft. of 4-in. in Plymouth and Portland Sts., 282 ft. of 6-in. in Portsmouth St., 4 ft. of 6-in. in Prison Point St. 75 ft. of

1¼-in. in Reed Ct., 141 ft. of 2-in. in Russell Ct., 201 ft. of 6-in. in Sixth St., 153 ft. of 4-in. in Somerset St., 2 ft. of 2-in. and 220 ft. of 6-in. in street off Sparks St., 155 ft. of 6-in. in Washington Ave., 361 ft. of 6-in. in Wendell St., 329 ft. of 6-in. in Western Avenue, and 8 ft. of 6-in. additional which was used in setting hydrants.

New Supplies.

Three hundred and seventeen new supplies have been laid, making a total of 9,730. Fifty-eight supplies have been renewed, of which number fifteen with thirteen others, not renewed, were lowered to prevent freezing. Thirty-nine supplies have been furnished with sidewalk shut-offs. Five have been enlarged, and eight extended. Supplies in Central Square, Plymouth, and Portland Streets. Douglass Street and Grigg Street have been connected to new extension.

Leakage.

Three hundred and seventy-five leaks have been stopped, namely; four on 3-in. main, eight on 4-in. main, one on 4-in. cement, one on 4-in joint, five on 6-in. main, one on 6-in cement, one on 6-in. joint, one on 20-in. main, one on 30-in. main, in Waltham, one on 30-in. main in Holworthy Street, two on hydrants, thirty-eight on supplies in street and three hundred and eleven on premises. Of these two hundred and ninety-three on premises, which were reported by the inspectors while canvassing, were repaired by owners or occupants.

A general inspection of pipes and fixtures has been made by the inspectors.

Drinking Fountains.

The number of drinking fountains at this date is fifteen.

Stand-pipes for Street Watering.

Two new stand-pipes have been set — one on Cambridge at Baldwin Street, and one on Washington Avenue. Forty-three stand-pipes have been re-arranged, and furnished with Chapman drip-valves for the accommodation of the Street Department.

Gates.

All the gates have been inspected, and put into good condition.

Boxes.

Sixteen hydrant, thirty-seven iron and ninety-six wooden boxes have been set in place of decayed, or otherwise worthless ones removed.

Hydrants.

Eighteen new hydrants have been set during the year All of these were of the Chapman Valve Co.'s make. Fourteen hydrants have been removed, of which ten were flush and four posts, making the number now in use 617.

The hydrants removed were located as follows: flush hydrants, from Cambridge St. and Dailey's alley, Cedar and Dudley Sts., Norton St., Main and Douglass Sts., Main and Essex Sts., Main and Norfolk Sts., Mount Auburn and Bow Sts., Mount Auburn and McDonald Sts., Sixth and Potter Sts., and Washington Ave. Boston posts from Main and Mount Auburn Sts., and Third and Winter Sts.; one Coffin post from Murray St., and one Perkins post from Erie St., between Brookline and Pearl Sts.

One of the flush hydrants on the premises of the New England Glass Co., North St., and the one at C. L. Jones', Pearl St., have been removed.

The following hydrants are located on private premises.

Location.	Post Hydrants.	Flush Hydrants.
Boston & Maine Railroad	3	4
Boston Rubber Works	1	
Boston Woven Hose Co.	1	
Houghton & Co.	2	2
New England Glass Co.		
North & Co.	1	
Page, George G. & Co.	1	
West End Street Railway Co.	1	
Total	10	6

The location of two hydrants on Binney Street has been changed as follows: one at the corner of Binney and Ninth Sts., and one on Binney St. at the railroad crossing. The line of the street was moved ten feet north for the accommodation of the American Rubber Co., and the hydrants were left ten feet in the street — therefore the change.

The number of street reservoirs now in use is eight.

Meters.

The number of meters in use at this date is two hundred and twenty-one

List of Meters in Use Nov. 30, 1888.

METERS.	LOCALITY.	SIZE.	KIND.
Andrews, Dr. R. R.	Harvard St.	5/8	Union
" D. H.	Main St.	1	Worthington
" "	Ninth St.	1½	Union
Alghieri, Simon	Main St.	¾	Worthington
American Net and Twine Co.	Third St.	1½	"
" Rubber Co.	Ninth St.	4	Crown
" Steam Safe Co.	Main St.	1	Worthington
" " " "	" "	2	Crown
Barbour, W. O.	Osborn St.	1	Worthington
" "	" "	¾	Desper
Bowman & Co.	Frank St.	¾	Worthington
Blake, I. W.	Church St.	1	"
" "	Palmer St.	¾	Ball and Fitts
Bay State Brick Co.	Spruce St.	¾	Worthington
Bird, H. M.	Broadway	5/8	Union
Bullock, O. S.	"	¾	Worthington
Burton, A. & E.	Harvard St.	¾	"
Boston Woven Hose Co.	Hampshire St.	4	"
" Stamping Co	Third St.	1½	Union
B. & M. R. R. New Round House	Prison Point St.	3	"
" " " Repair Shop	Bridge St.	2	Worthington
" " " Round-house	Prison Point St.	2	"
" " " " "	" " "	2	"
" " " Paint Shop	" " "	1	"
" " " Car-house	" " "	2	"
" " " Filling Locomotive	" " "	6	Union
Chemsford Iron Foundry	Bridge St.	¾	Worthington
Chase H. and L.	North St.	1	"
Chadwick Lead Works	" "	1	Union*
City of Cambridge, Shepard School	North Ave.	2	Worthington
" " " Ward 1 Building	Brattle Sq.	1½	"
" " " Ward 4 Building	Central Sq.	1½	"
" " " Upton School	Upton St.	2	"
" " " Latin School	Lee St.	1	"
" " " Cemetery	Coolidge Ave.	4	"
" " " Almshouse	Tannery St.	2	"
Cambridge Gas Light Co.	Third St.	2	"
" " " "	" "	1	"
" " " "	Ash St.	¾	Crown
Carr Bros.	Lopez St.	1	Worthington
Cambridgeport Diary Co.	Magazine St.	1	"
Cambridge Electric Light Co.	Albro St.	4	"
Cambridge Hospital	Mt. Auburn St.	1½	Crown
Campbell Bros	Osborn St.	¾	Worthington
Cambridge Y. M. C. Ass'n	Main St.	2	"
Cushman Bros	" "	¾	Union
Close, Geo.	Broadway	1	Worthington
Coolidge & Caswell	Franklin St.	2	Union
Coleman Bros.	Broadway	1	Worthington
Clark, B. P. & Co.	Main St.	1½	"
Cochran & Co.	Potter St.	1	"
Childs & Co.	Main and Osborn Sts.	¾	Union
Cass, Fred	Auburn St.	4	Crown
Cofran, N. M.	Concord Ave	1½	Union
Coolidge, J. G., Greenhouse	Coolidge Ave.	1	Worthington
" " Barn	" "	2	"
Dow, W. L. W.	Deacon St.	1	"
Doyle, Wm.	Cambridge St.	1½	Union
Davis, Curtis & Co.	Broadway	2	Worthington
" J C. & Son	"	2	Crown
Dugan & Rutherford	First St.	1	"
Daniels, Badger & Co.	Albany St.	2	"
Davenport, A. H.	Cambridge St.	2	Worthington
" "	Otis St.	¾	Crown
Dailey, C. W.	Cambridge St.	1	Worthington
Derby, H.	Main St.	1	Crown
Dover Stamping Co.	Pleasant St.	6	Union
Downing, Theo	Eustis Ct.	1	Worthington
Draper, Francis & Co.	Otis St.	¾	"
Dow, Davis & Co.	Portland St.	2	Crown
Day Cordage Co.	Rogers St.	2	"
Dee, T. W.	Brattle St.	1	"
East Cambridge Club Stable	First St.	1	Worthington
Episcopal Seminary	Brattle St.	1½	"

List of Meters.—*Continued.*

METERS.	LOCATION.	SIZE.	KIND.
England, Wm	Farwell Pl	¾	Worthington
Furfey, James	Brookline St	¾	“
Gillman, Chas. H. & Co	Clark St	¾	“
Geldowsky, F	Thorndike St	2	Union
Gilmore & Eustis	Portland St	2	Worthington
Goepper Bros	Ninth St	1½	“
“ “	Spring St	2	“
Greely, Leander	Broadway	1½	“
Griffin & Dolan	Decatur St	⅝	Crown
Hazen, D. M.	Elm St	1	Worthington
Holton, Fred H. & Co	Harvard St	2	“
Harvard College, Holworthy Hall	College Grounds	¾	“
“ “ Boylston Hall	“ “	2	Crown
“ “ Stoughton Hall	“ “	¾	Worthington
“ “ Sever Hall	“ “	¾	“
“ “ Thayer	“ “	1½	“
“ “ In yard	“ “	1½	“
“ “ University Hall	“ “	2	Union
“ “ Jarvis Field	Everett St	2	Worthington
“ “ “ “	“ “	¾	“
“ “ Memorial Hall	Cambridge St	2	“
“ “ Boat-house	De Wolfe St	1	Union
“ “ Botanic Garden	Garden St	1	Crown
“ “ Gymnasium	Cambridge St	1	“
“ “ Holyoke House	Harvard St	2	Worthington
“ “ Museum	Divinity Ave	1	“
“ “ Scientific School	Kirkland St	¾	“
“ “ Law School	Holmes Pl	1½	“
“ “ Laboratory	“ “	1	“
“ “ Holmes Field	North Ave	2	Union
Hawley Machine Co	First St	1	Worthington
Hilton, J. M.	Harvard St	1½	“
Hewes, A. H. & Co	Crescent Ave	1	“
Holt & Bugbee	East St	¾	“
Houghton, H. O. & Co	Blackstone St	2	“
“ “ “	“ “	⅝	“
Howe & Putney	Distilhouse St	1	“
Howland, W. B.	Linden St	⅝	Crown
Ivers & Pond, No. 1	Main and Albany Sts	2	Worthington
“ “ No. 2	Albany St	2	Crown
Irving & Casson	Otis, cor. First St	1	Worthington
Jones, C. L. & Co.	Pearl St	¾	“
Keeler & Co	Main St	1	Union
Kemp, L. & Son	Davis St	1	Worthington
Kennedy, Frank A. & Co	Green St	3	“
“ “ “ “	Franklin St	1½	Union
Kendall & Sons Engine Room	Main St.	¾	Worthington
“ “ Machine Shop	“ “	¾	“
Low, J. W	Reed St	1½	“
Little, Brown & Co	Blackstone St	¾	Union
Lamb & Ritchie	Albany St	1	Crown
Middlesex County, House of Cor	Second St	2	Worthington
“ “ “ “	Spring St	4	Union
“ “ Court House	Thorndike St	1	Worthington
“ “ “ “	Otis St	¾	“
“ “ Reg. of Deeds	“ “	1½	“
Mason & Hamlin	Broadway	1½	Crown
Middlesex Bleachery	Sacramento St	1	Worthington
Millan, Alex	Brattle Sq	¾	Crown
Moring, Mrs. A. L.	Main St	1	Worthington
Murdock, Walter H.	Griggs St	⅝	Ball and Fitts
Mt. Auburn Greenhouse	Brattle St	1	Worthington
“ “ Cemetery	Mt. Auburn St	⅝	Desper
Maverick Oil Works	Sixth St	2	Worthington
Miller & Shaw	Broadway	1	“
Morrill & Allen	Main St	¾	Crown
New England Tel. Co	“ “	¾	“
“ “ Glass Co	North St	1	Worthington
Norton, E. H	Windsor	1	“
National Linseed Oil Works	Fifth St	1	“
O'Brien, Jonn F	Coolidge Ave	¾	“
“ “ “ Ross House	Main St	¾	“
Place, Chas	Norfork St	1	“
Page, Carlos & Co	Broadway	1½	Union

List of Meters.—*Continued.*

METERS.	LOCATION.	SIZE.	KIND.
Page, Geo. G. & Co.	Hampshire St.	4	Union
" " " "	" "	2	Worthington
Parry Bros.	Raymond St.	¾	"
Patterson, R. J.	Cedar St.	2	Union
Porcellian Club.	Harvard St.	1	Crown
Porter's Hotel	North Ave.	¾	Worthington
Phillips, Geo. L.	Main St.	¾	"
Roberts, Geo. B., Boiler Works	" "	¾	"
Reardon's, John, Sons	Waverly St.	4	"
Revere Sugar Refinery	Water St.	3	"
" " "	" "	3	Union
Reversible Collar Co.	Mt. Auburn St.	1	Worthington
Rawson & Morrison	Main St.	⅝	"
Roughan, M., B. & M. R. R. yard.	Prison Point St.	2	Union
Rideout, M. E.	State St.	1	Worthington
Roberts, O. P.	Brattle Sq.	1	"
Rogers, Geo. M.	Washington St.	3	"
Salvation Army	Prospect St.	⅝	"
Stow, D. C., Furniture Co.	First St.	¾	"
Spaulding Cable Works	Main St.	¾	Terry
Sands, M. W., Brick Yard	Walden St.	1	Worthington
" " " "	Dublin St.	⅝	"
" " " "	" "	¾	Union
Shorey, Geo. L.	Kinnaird St.	4	"
Smart, D. C.	Main St.	2	Worthington
Saurman, B. F.	Gore St.	¾	Union
Sortwell, D. R. & Co.	Distilhouse St.	2	Worthington
Standard Carpet Lining Co.	Third St.	2	Crown
St. Mary's Church	Norfolk St.	2	Worthington
" " Gymnasium	Prospect St.	¾	"
Spear, Gregory & Co.	Rogers St.	1½	"
Slavens, J. W. L.	Bridge St.	1	Crown
Squire, J. P. & Co.	Gore St.	2	"
" " "	" "	1	"
" " "	" "	4	Union
" " "	" "	6	Gem
Schaeffer Electric Co.	Main St.	¾	Union
Tower, Sylvester	Broadway	2	Worthington
Thurston, Hall & Co.	Elm St.	1	"
Teele, Frank H.	Lincoln Ct.	¾	"
Thayer, Henry & Co.	Broadway	2	"
Tracey, M. F.	Boylston St.	1	Desper
Temple, F. L.	Kirkland St.	2	Worthington
Union Pacific Tea Co.	Main St.	¾	Union
Underhill & Anderson	First St.	1½	Worthington
" "	First and Thorndike Sts.	2	Crown
West End Railway Co., Waiting-room.	Bridge St.	⅝	Worthington
" " " " Stable	Brookline St.	1	"
" " " " Waiting-room.	Main St.	¾	Union
" " " " Paint Shop	Dunster St.	¾	Worthington
" " " " Repair Shop	" "	¾	"
" " " " Car-house	" "	¾	"
" " " " Stable	" "	¾	"
" " " " Stable	" "	1	"
" " " " Office	Harvard Sq.	¾	Crown
" " " " Washing Cars.	Murray St.	1½	Worthington
" " " " " "	" "	1	"
" " " " Stable	" "	1½	"
" " " " Car-house.	Camb. and Baldwin Sts.	1	"
" " " " Stable	Baldwin St.	1	"
" " " " "	Cambridge St.	1	"
" " " " "	" "	1	"
" " " " "	Mt. Auburn St.	2	Crown
" " " " "	North Ave.	2	Worthington
" " " " "	Main St.	2	"
" " " " "	River St.	1	"
Warren, J. H., Felton Hall.	Cambridge St.	1	"
Woods, John M.	Bridge St.	1½	"
Whitney, W. H.	Main St.	¾	Crown
Wilson, John & Son	Brattle St.	1	Union
Wight & Scorgie	Mt. Auburn St.	¾	Crown
Wilkins, Wm.	Earl St.	1	"
Zerega, J. T.	State St.	¾	Worthington

List of Drinking Fountains, Nov. 30, 1888.

Bridge Street, junction of Cambridge Street.
Broadway, corner of Norfolk Street.
Brattle Square, east side at Brewer's Block.
Brattle Street, junction of Fresh Pond Lane.
Central Square, west side.
Central Square, east side.
Garden Street at Washington elm.
Hampshire Street, junction of Broadway.
Harvard Square, at the flag-staff.
Inman Square, east side.
Main Street, junction of Broadway.
Main Street, junction of Mount Auburn Street.
North Avenue, corner of Walden Street.
North Avenue, north side, west of Cameron Street.
Putnam Avenue, corner of Brookline Street.

List of Stand-Pipes for Street Watering, Nov. 30, 1888.

Brattle Street, near University Press.
Brattle Street, corner of Sparks Street.
Brattle Street near Fayerweather Street.
Brattle Street, near Fresh Pond Lane.
Bridge Street, junction of Cambridge Street.
Broadway, near Third Street.
Broadway, corner of Sixth Street.
Broadway, corner of Winsor Street.
Broadway, junction of Hampshire Street.
Brookline, corner of Putnam Avenue.
Cambridge and Baldwin Streets.
Cambridge Street, near Warren Street.
Cambridge Street, near Winsor Street.
Cambridge Street, at Inman Square.
Columbia Street, near Austin Street.
Concord Avenue, near Wyeth Street.
Coolidge Avenue, opposite entrance to Mount Auburn Cemetery.
Dana Street, corner Chatham Street.
Fresh Pond Avenue, opposite Vassal Lane.
Gore Street, west of Third Street.

Green Street, near Western Avenue.
Garden Street, near Chauncy Street.
Harvard Street, corner of Prescott Street.
Inman Street, near Broadway.
Kirkland Street, near Quincy Street.
Main Street, near Portland Street.
Main Street, near Hancock Street.
Magazine Street, opposite Warland Street.
Mount Auburn Street, near Athens Street.
Mount Auburn Street, near Willard Street.
Mount Auburn Street, corner of Coolidge Avenue.
North Avenue, near Common.
North Avenue, corner Sacramento Street.
North Avenue, near Roseland Street.
North Avenue, near Beech Street.
North Avenue near Spruce Street.
North Avenue, corner Norris Street.
North Avenue, opposite Tannery Street.
Prison Point Street, opposite Round House.
River Street, near Putnam Avenue.
Sixth Street, near Thorndike Street.
Spruce Street, corner Cedar Street.
Third Street, near Rogers Street.
Thorndike Street, near Third Street.
Western Avenue, corner Howard Street.
Walden Street, corner Mount Pleasant Street.
Washington Avenue, near Lambert Avenue.

Main Pipe Laid, Number of Gates and Fire Hydrants.

LOCATION.	IRON PIPE.		GATES.		HYDRANTS.	
	Length.	Size.	No.	Size.	No.	Size.
	Feet.	Inch.		Inch.		
Albro Street	581½	6	3	6	....	....
Albro Street	3	1½	1	6	....	....
Avon Hill Street	60	6	1	6	....	....
Cambridge St. & Dailey Alley	15	6	....	....	1	6
Carlisle Street	3	1½	1	4	....	....
Carlisle Street	119½	4	....	....	....	....
Carver Street	192	4	....	....	....	....
Cedar and Dudley Sts	5½	6	....	....	1	6
Central Square	33	6	....	....	1	6
Cherry and Washington Sts	....	....	1	4	....	....
Clark Street	112	4	1	4	....	....
Clark Street	3	1½	....	....	....	....
Clifton Street	84	6	....	....	....	....
Cottage Court	52	4	....	....	....	....
Creighton Street	3	1½	....	....	....	....
Creighton Street	564	6	1	6	....	....
Cushing Court	196	4	1	4	....	....
Cushing Court	3	1½	....	..	....	....
Douglass Street	134	4	1	4	....	....
Erie Street	3	6	....	....	1	6
Fiske Avenue	152	4	1	4	....	....
Fiske Avenue	3	1½	....	....	....	....
Gray Street	511½	6	2	6	1	6
Grigg Street	192	4	....	....	....	....
Grigg Street	3½	1½	....	....	....	....
Hammond Street	800	4	1	4	....	....
Hammond Street	5	6	....	....	1	6
Harold Place	135	4	1	4	....	....
Harold Place	3	1½	....	....	....	....
Harvard, near Dana	8	6	....	..	1	6
Hews Street	99½	4	1	4	....	....
Huron Street	147	4	1	4	....	....
Huron Street	3	1½	....	....	....	....
Irving and Cambridge Sts	43	6	1	6	1	6
Lambert Avenue	333	6	1	6	....	....
Magazine Street	193	6	....	....	....	....
Main and Douglass Sts	7	6	....	....	1	6
Main and Essex Sts	7	6	....	....	1	6
Main & Mount Auburn Sts	2	6	....	....	1	6
Main and Norfolk Sts	7	6	....	....	1	6
Mt. Auburn & McDonald Sts.	9	6	....	....	1	6
Murray Street	2	6	....	....	1	6
Ninth Street	144	8	2	8	....	....
Pemberton Street	110	6	....	....	....	....
Pemberton Street	3	1½	....	....	....	....
Plymouth and Portland Sts	104	4	1	4	....	....
Portsmouth Street	282	6	2	6	....	....
Prison Point Street	4	6	2	6	....	....
Reed Court	75	1¼	....	....	....	....
Russell Court	141	2	....	....	....	....
Sixth Street	201	6	1	6	1	6
Somerset Street	153	4	1	4	....	....
Sparks Street	220	6	1	6	....	....
Sparks Street	2	2	....	....	....	....
Third and Winter Sts	4	6	....	....	1	6
Washington Street	155	6	1	6	1	6
Wendell Street	361	6	....	....	....	....
Western Avenue	329	6	1	4	1	6
Winsor and Washington Sts.	....	....	2	4	....	....

Recapitulation.

	8 Inch.	6 Inch.	4 Inch.	2 Inch.	1½ Inch.	1¼ Inch.	Total.
Length in feet of iron pipe......	144	4139½	2588	143	30½	75	7120
Number of gates................	2	17	15	....	....	....	34
Number of hydrants............	....	....	....	....	....	....	18

New Supplies.

	6 Inch.	4 Inch.	2 Inch.	1½ Inch.	1¼ Inch.	1 Inch.	¾ Inch.	Total.
Length in feet of pipe laid............	25	190½	777	642	706½	1922½	8029½	12,293
Number of Supplies....................	1	6	12	9	20	47	222	317
Number of stop and waste-cocks.......	....	....	3	8	18	44	223	296
Number of stop and waste-valves......	....	....	9	1	2	4	3	19
Number of screw-cocks................	....	....	9	9	21	47	223	309
Number of sidewalk-cocks.............	....	....	....	....	....	47	220	267
Number of service boxes..............	....	....	....	....	....	....	....	269
Number of boxes, frames and covers..	....	....	....	....	....	....	....	51

List of Check-Valves.

OLD HIGH-SERVICE.

	Size in Inches.
Lake View Avenue, 150 feet north from Huron Street..........	10
Lake View Avenue, 150 feet north from Brattle Street...	6
Fayerweather and Reservoir Streets............	6
Concord Avenue, 135 feet south from Buckingham Street........	6
Garden and Linnæan Streets.	6
Raymond and Linnæan Streets..................................	6
Avon Hill and Linnæan Streets.................................	6
Arlington Street, 230 feet west of North Avenue................	6
Mt. Vernon Street, 100 feet west from North Avenue..........	6
Mt. Pleasant Street, 150 feet south from Walden Street.······....	6

List of Check-Valves.—*Continued.*

NEW HIGH-SERVICE.

	Size in Inches.
Highland Street, on old 12-inch main	12
Dana Street and Broadway	4
Harvard Street, near Hancock	6
Centre Street, near Hancock	4
Dana Street, near Main	4
Harvard and Ellery Streets, two valves	6
Harvard and Trowbridge Streets, two valves	4
Harvard and Ware Streets	4
Harvard and Prescott Streets	4
Quincy Street, near Broadway	4
Broadway, on line of 6-inch pipe crossing College Grounds	6
Waterhouse Street, near small common	6
Kirkland and Cambridge Streets	10
Berkeley Street, near Craigie	4
Appian Way, near Brattle Street	4
Linnæan and Lancaster Streets (old high service extension)	6
Kirkland Street and Frisbie Place	4

Statement of Stock on Hand, Dec. 1, 1888.

FOR STREET MAINS (IRON PIPES AND FITTINGS.)

	48 In.	36 In.	30 In.	24 In.	20 In.	16 In.	12 In.	10 In.	8 In.	6 In.	4 In.	2 In.
Straight pipes, 12 feet lengths	2	..	1	..	19	6	83	104	159	159	579	12
Bends	..	..	1	3	2	2	2	8	12	10	11	..
Y Branches	..	..	..	1	1–12	..	1	..	..	..	..	..
Sleeves	..	..	1	4	5	2	1	..	8	10	21	3
Drain offsets	..	..	..	..	..	..	..	..	..	8	..	..
Offsets	..	..	..	..	..	..	..	6	4	9	5	..
Gates	..	..	..	..	..	..	2	2	..	3	3	2
Caps	..	..	..	..	2	..	8	2	4	16	14	..
Blow-off Branches	..	..	..	..	1-6	..	..	..	..	..	..	..
Clamps f'r c'mt pipe	..	..	..	..	4	..	..	..	..	..	..	..
Check-valves	..	..	..	2	..	..	..	1	..	..	..	..
T's	..	..	..	3–6	2–6	1–6	3–8	8–6	6–6	6–4	19–4	2–3
"	..	..	..	1–8	1-12	..	..	3–8	13–8	..	..	..
"	..	..	..	1–16	2–20	..	..	..	..	..	..	..
"	..	..	..	1–20	..	..	..	..	..	..	..	..
"	..	..	..	1–24	..	..	..	..	..	..	..	..
Crosses	..	..	1–6	.	1–10	3–6	5–4	7–6	2–4	8–4	14	2
"	..	..	..	..	1–20	1–12	7–6	2–8	..	1–6	..	..
"	..	..	..	..	..	..	5–10	1–10	..	..	..	..
Reducers	..	..	..	1–10	1–8	1–6	..	1–6	8–6	11–4	..	..
	..	..	..	..	1–10	..	..	..	..	..	..	..
"	..	..	..	..	2–12	..	..	1–8	..	..	..	..
Wooden plugs	..	..	..	2	2	2	3	1	13	25	18	8
Clamp sleeves	..	..	..	5	4	2	4	6	4	8	12	5

Statement of Stock.—*Continued.*

FOR SUPPLIES (GALVANIZED PIPE AND BRASS FITTINGS).

	2 Inch.	1½ Inch.	1¼ Inch.	1 Inch.	¾ Inch.	½ inch.
Feet in length of galvanized pipe	338	528	646	1054	6528	14
Elbows	24	29	34	54	70	18
Street elbows	..	..	..	16	70	..
Couplings	51	84	55	79	43	19
Unions	57	35	16	19	42	..
Faucets	..	..	..	13	14	14
Stop and waste cocks	24	11	..	12	30	..
Screw-cocks	9	6	5	10	130	..
Sidewalk cocks	..	..	..	66	224	..
Screw-cocks for cement pipes	..	4	..	18	..	..
Blow-off cocks	..	3	..	..	..	..
Air chambers	..	..	..	46	6	36
Nipples	34	97	89	355	230	..
Socket end of rods	..	..	..	..	..	15
Plugs	7	20	29	42	25	..
Fountain-cocks	..	..	..	..	6	..
Sill-cocks	..	..	..	..	7	..
Hose-nipples	..	..	..	..	12	..
T's	22	27	87	75	145	35
Caps	49	13	14	6	16	..
Lead connections	..	..	..	..	20	..
Hydrant-cocks	..	..	..	4	6	..
Check-valves	1	1	1	4	4	..
Chapman stop and waste-valves	16	24	13	9	87	..
Bushings, different sizes	..	..	..	..	..	229
Nickeled sill-valves	..	..	..	..	..	6
Crosses	4	16	3	5	..	..
Gates	..	..	..	..	..	2
Clips, different sizes	..	..	..	..	..	32
Reducing couplings, different sizes	..	..	..	..	..	113
Brass unions for lead connections	..	..	..	..	33	..
Clamp-sleeves for cement-pipes	..	..	..	..	..	23
Garden hydrants	..	..	..	..	..	3

Stock in Shop and Yard.

3 hydrant-valves.
30 bolts for flush hydrants.
23 stop and wastes for flush-hydrants.
4 lead kettles.
3 furnaces.
3 ladles.
3 bench vises.
4 drinking fountains.
1 meter-box
5 iron boxes.
11 hydrant boxes.
12 wooden gate-boxes.
38 large frames and covers for gates.
28 small frames and covers for gates.
25 large frames and covers for hydrants.
260 risers for wooden boxes.
170 seals.
2 breast drills.
1 ratchet for tapping main pipe.
3 machines for tapping cement pipe.

1 washer cutter.
2 platform scales.
2 grindstones.
1 diaphram pump.
1 hand-pump.
9 thawing-out pumps
450 thawing-out pipes.
½ barrel clay.
2 hatchets.
3 hoes.
1 hay cutter.
3 small derricks.
1 breast derrick.
15 pipe wrenches.
2 nut wrenches.
7 monkey wrenches.
30 nuts.
1 axe.
4 sledge hammers.
2 paving hammers.
4 hand hammers.
Lot of old junk.
2 pair rubber boots.
1 cord wood.
25 feet ¾-inch hose.
7 tongs.
11 pipe cutters.
10
½ cask cement.
9 screw-drivers.
3 saws.
1 floating hook.
1 large mall.
5 barrels R. R. spikes.
Plane, square, compasses, etc., for carpentering.
Lot of lumber.
Lot of spindles for 4-inch and 6-inch gates.
4 horses.
1 truck.
5 wagons.
6 harnesses.
2 sleighs.
2 double-runner sleds.
8 blankets.
3 buffalo robes.
2 lap robes.
3 oil coverings for horses.
1 lathe, with usual chucks and tools.
1 water motor.
1 threading machine, with dies complete.
1 drilling machine, with drills complete.
3 tapping machines for supplies, with taps and drills.
4 hooks for tapping main pipe.
2 2-inch taps and drills.
4 sets main pipe tools.
9 gate wrenches.
4 blow-off wrenches.
4 inch cock wrenches.
18 small tee wrenches.
1 30 overflow bell.
1 stove, with fixtures.
1 tank for measuring water.
1 work bench with drawers.
1 work bench.
1 clock.
50 block stones.
6 wooden horses.
7 oil cans.
1 10-inch iron B. O. box.
1 tool chest.
9 chains.
28 shovels.
3 snow shovels.
36 picks.
21 trench rammers.
2 paving rammers.
12 pails.
6 iron bars.
2 tamping bars.
793 lbs. lead.
60 lbs. packing.
7 hydrant bodies.
1 set hydrant tools.
281 lead pipes.
15 post hydrant jackets.
8 post hydrants.
19 post hydrant rods.
5 hammers.
Lot of block and wedges.
Lot of counters and ratchet.
Movements for meters.
1 ¾ inch Worthington meter.
3 ⅝-inch Worthington meters.
4 1-inch Worthington meters.
4⅝-inch Union Rotary meters.
2 ¾-inch Union Rotary meters.

2 1½-inch Union Rotary meters.
1 2-inch Union Rotary meter.
1 6-inch Union Rotary meter.
1 ¾-inch Crown meters.
11-inch Crown meter.
2 1½-inch Crown meter.
2 thawing furnaces.
1 thawing boiler.
1 watering cart.
2 ladders.
2 barrels charcoal.
1 chain tongs.
6 chairs.
1 B. O. hose.
150 feet 2½ hose.
10 plates with dies.
13 shut-off wrenches.
2 trowels.
46 lbs. sheet rubber packing.
Lot of old brass.
13 shut-off rods.
4 flush hydrant wrenches.
4 tool bags.
20 lanterns.
19 2-inch offsets.
6 fountain faucets.
2 fountain cocks.
3 forks.
1 rake.
3 ½-inch cock wrenches.
2 large tapering gate boxes.

Tools at Fresh Pond.

6 chisel picks.
2 chisel bars.
4 sledge hammers.
3 paving hammers.
1 row boat and oars.
1 weed cutter.
4 chisels and 1 hammer for main pipe.
1 sprinkling can.
1 rope tackle.
1 lantern.
3 gate wrenches.
1 cock wrench.
1 fork wrench.
2 ropes.
15 old wheelbarrows.
43 shovels.
11 picks.
4 iron bars.
3 pails.
6 chains.
8 rakes.
2 saws.
1 hatchet.
3 axes.
6 steel drills.
1 claw hammer.
2 plows.
1 scraper.
3 grub hoes.
4 rammers.
3 post hole scoops.
1 harrow.
1 gravel screen.
2 tool chests.
1 R. R. spike hammer.
1 drag.
250 feet of 1-inch hose and nozzle.
1¾ casks wire nails.
Lot of old R. R. ties.
Lot of old plank.
Lot of old sheet piling.
2 lengths of 30-inch pipe.
2 levels.

Tools at Stony Brook.

1 row boat and oars.
3 gate wrenches.
2 pair grab hooks.
1 rope fall.
1 chain fall.
40 feet of rope.
1 ladder.
2 chairs.
1 stove and fixtures.
17 cast-iron signs.
1 monkey wrench.
1 cold chisel.
1 grindstone.
2 shovels.
3 picks.
1 iron bar.

1 sprinkling can.
1 reamer.
1 whipple-tree and traces.
1 drag.
3 rakes.
1 fork.
2 scythes and snath.
2 whet-stones.
1 sod knife.
2 lanterns.
1 oil can.
1 oiler.
1 lead kettle.
1 ladle.
1 tip cart.
2 lengths 36-inch pipe.
12 lengths 30-inch pipe.
2 30-inch sleeves.
2 pike poles.
1 sickle.

REPORT

OF THE

ENGINEER OF THE PUMPING STATION.

PUMPING STATION,
CAMBRIDGE WATER WORKS,
December 12, 1888.

Hiram Nevons Esq., Superintendent :—

SIR: The machinery at the pumping station is in good condition. The increased consumption of water during the past year has rendered it necessary to run both large engines a part of each day for the larger part of the year, during January and February the amount pumped being on some days as much as 7,000,000 gallons. Early this year it was recommended to the Water Board that new water cylinders be put upon Engine No. 2, increasing its capacity from 5,000,000 to 10,000,000 gallons daily.

The Board took favorable action in the matter and specifications were prepared, and plans and estimates asked for from H. R. Worthington and the Geo. F. Blake Manufacturing Co. The latter being the lowest bidder was awarded the contract, and has so far completed its work that the engine has been tested and has shown that it is capable of doing the increased work easily. I would recommend that No. 1 engine be altered in the same way at an early day and that an independent air pump and condenser be attached to the high service engine, so that it can be run when the main engines are stopped. Also that the pumping station be lighted by electricity; it can be done at a very slight expense and will be much cheaper than the present way of lighting.

Following will be found a statement of the expenses at the pumping station, with the usual tables.

Respectfully submitted,

EDWIN C. BROOKS,
Engineer.

STATEMENT.

$974\frac{240}{2240}$ tons Cumberland coal at $4.65	$4,529 60
$76\frac{260}{2240}$ tons Cumberland coal at $4.56	347 09
Oil, waste, packing, etc.	261 05
Repairs on engines and boilers	41 21
Repairs on buildings and care of grounds	47 98
Tools	88 50
Gas	103 74
Ice	19 20
Salaries	5,417 62
Total	$10,855 99

Engine Record, Pond Levels and Rainfall.

DATE.	LOW SERVICE ENGINES.						HIGH SERVICE ENGINES.						Total water pumped.	Daily average water pumped.	Total coal consumed.	Daily average coal consumed.	Average height of Pond.	Rainfall.
	Total pumping time.		Daily average pumping time.		Total water pumped.	Daily average water pumped.	Total pumping time.		Daily average pumping time.		Total water pumped.	Daily average water pumped.						
	Hrs.	Min.	Hrs.	Min.	Gallons.	Gallons.	Hrs.	Min.	H s.	Min.	Gallons.	Gallons.	Gallons.	Gallons.	Lbs.	Lbs.	Feet.	Inches.
December, 1887..	421	45	13	36	101,602,200	3,277,490	421	45	13	36	11,074,733	357,249	112,676,933	3,634,739	180,400	5,819	8.30	4.22
January, 1888....	608	30	19	38	137,259,000	4,427,710	474	45	15	19	12,737,741	410,895	149,996,741	4,838,605	234,400	7,561	11.48	3.32
February, 1888..	627	35	21	38	132,788,100	4,578,900	425	35	14	41	10,970,400	378,290	143,758,500	4,957,190	225,600	7,779	13.16	3.95
March, 1888......	557	55	18	00	117,693,000	3.796,548	420	15	13	33	10,990,291	354,526	128,683,291	4,151,074	218,200	7,039	15.13	5.55
April, 1888	453	25	15	07	100,384,200	3,346,140	397	10	13	14	10,613,357	353,778	110,997,557	3,699,918	188,800	6,293	15.71	2.60
May, 1888........	485	45	15	40	111,286,500	3,589,887	414	15	13	22	11,235,264	362,428	122,521,764	3,952,315	190,000	6,129	16.04	6.36
June, 1888	537	05	17	54	121,815,000	4,060,500	410	45	13	42	11,614,618	387,154	133,429,238	4,447,654	194,000	6,467	15.72	3.25
July, 1888........	529	40	17	05	125,485,500	4,047,919	422	50	13	38	9,943,738	320,766	135,429,238	4,368,685	199,000	6,420	14.46	2.87
August, 1888	491	30	15	51	119,355,000	3,850,161	422	15	13	37	9,566,381	308,593	128,921,381	4,158,754	193,000	6,226	13.10	7.08
September, 1888.	455	10	15	11	111,976,200	3,732,540	411	20	13	41	9,118,163	303,966	121,095,163	4,036,506	178,500	5,950	13.61	8.28
October, 1888....	446	15	14	24	106,995,000	3,451,452	446	15	14	24	9,890,938	319,062	116,885,938	3,770,514	180,100	5,810	15.48	4.83
November, 1888..	429	30	14	19	101,405,700	3,380,190	429	30	14	19	8,687,558	289,585	110,093,258	3,669,775	170,500	5,683	15.60	7.70
Total	6,044	05			1,388,045,400		5,096	40			126,443,182		1,514,488,582		2,352,500			60.01
Daily Average..	16	31			3,792,474		13	56			345,473		4,137,947		6,428		13.98	

Stock on Hand, December 1, 1888.

1,150 tons Cumberland coal, 45 gallons cylinder oil, 50 gallons engine oil, 10 lbs. tallow, 70 lbs. cotton waste, 50 lbs. rubber packing, 40 lbs. Usidurian packing, 18 lbs. square flax packing, 52 manhole gaskets, 43 handhole gaskets, 8 9-in. rubber valves, 2 valve seats, 2 steam gauges, 50 lbs. of soap, 100 fire brick, 1 broom, 2 bbls. brimstone, 300 lbs. bolts and nuts, 1 lot iron pipe, 1 lot pipe fittings.

Tools, Furniture and Instruments.

1 18-in.x10-ft. engine lathe, with chucks, tools, etc., 15-in.x6-in. engine, 1 lot shafting, belting and pulleys, 1 grindstone, 2 vises, 1 vise bench, 3 die-plates and dies, 1 set pipe taps, 1 set hand taps, 2 pipe cutters, 14 pairs pipe tongs, 3 hand hammers, 1 copper hammer, 18 cold chisels, 1 hand bellows, 12 files, 6 screw wrenches, 4 Stillson wrenches, 2 clamp screws, 1 sledge, 2 ratchets, 24 drills, 1 breast drill, 2 jack screws, 6 steel bars, 2 soldering irons, 4 cylinder-head cranes, 12 eye-bolts, 75 starting-bolts, 1 chain fall, 3 tackles, 2 ladles, 4 wooden horses, 1 oil cabinet, 1 set measures, 1 lot oil cans, 1 oil pump, 1 carpenter's bench, 4 planes, 4 hand-saws, 8 chisels, 7 gouges, 2 screw-drivers, 2 bit stocks, 13 bits, 3 augers, 1 draw-knife, 1 spokeshave, 1 axe, 3 hatchets, 2 squares, 1 set fire tools, 1 coal car, 1 pair platform scales, 2 wheelbarrows, 12 scoop shovels, 1 tube brush, 1 forge, 1 anvil, 5 pairs tongs, 2 hand chisels, 1 lawn mower, 1 steel rake, 4 forks, 1 weeder, 1 spade, 1 pick, 6 ladders, 3 step-ladders, 200 feet 2-in. hose and pipe, 2 water coolers, 6 fire pails, 6 water pails, 1 window brush, 1 floor brush, 1 dust brush, 1 feather duster, 1 dust pan, 1 lot cocoa matting, 5 mats, 6 spittoons, 1 lot gas fixtures, 4 bracket lamps, 4 lanterns, 3 hand lamps, 1 desk, 2 tables, 2 clocks, 12 chairs, 1 barometer, 1 hygrophant, 1 thermometer, 2 rain gauges, 1 snow gauge.

Tools, Furniture, etc., at Engine House at Pond.

1 12x20-in. portable engine and boiler, 1 No. 2½ Blake pump, 1 12-in. centrifugal pump, 2 12-in. Follansbee propeller pumps, 1 Hancock inspirator, 1 hand force pump, 10 ft. ¾-in. steam hose, 1 set fire tools, 1 belt awl, 1 belt punch, 2 bracket lamps, 1 large lantern, 1 stove and pipe, 1 cot bed and bedding.

REPORT

OF THE

TRUSTEES OF THE SINKING FUND OF THE CAMBRIDGE WATER WORKS.

To the Honorable the City Council :—

THE undersigned, trustees of the Sinking Fund of the Cambridge Water Works, herewith submit their annual report of the fund committed by law to their charge: —

Dr.

The amount of the fund at the date of the last report, Nov. 30, 1887, was	$838,597 01	
Amount received from the City Treasurer of Cambridge, the same having been derived from the annual water rates, and being three per cent on the amount of outstanding Water loan bonds	49,575 00	
Amount of surplus received in the running accounts of the Water Works for the year ending Nov. 30, 1888	7,424 42	
Amount of interest received on investments	35,360 89	
Amount of premium received in the sale of securities	651 35	
		$931,608 67

Cr.

Amount paid the City Treasurer of Cambridge with which to meet the Water loan bonds which matured April 1, 1888	175,000 00	
Amount of interest paid the City of Cambridge, for advance payments to meet the maturing debt in 1887 and 1888	2,666 67	
Balance, representing the amount of the fund Nov. 30, 1888, all securities taken at par	753,942 00	
		931,608 67

Securities belonging to the Sinking Fund, November 30th, 1888.

Cambridge Water Loan, six per cent bonds maturing May 1, 1889	$8,000 00	
Cambridge Water Loan, six per cent bonds, maturing July 1, 1890	31,000 00	
Cambridge Water Loan, six per cent bonds, maturing May 1, 1891	26,000 00	
Cambridge Water Loan, six per cent bonds, maturing July 1, 1892	1,000 00	
Cambridge Water Loan, four per cent bonds, maturing Nov. 1, 1894	6,000 00	
Cambridge Water Loan, six per cent bonds, maturing April 1, 1895	37,000 00	
Cambridge Water Loan, three and one-half per cent registered bonds, maturing after April 1, 1896	100,000 00	
Cambridge Water Loan, three and one-half per cent registered bonds, maturing after July 1, 1896	75,000 00	
Cambridge Water Loan, six per cent bonds, maturing July 1, 1896	46,000 00	
Cambridge Water Loan, six per cent bonds, maturing July 1, 1897	16,000 00	
Cambridge Water Loan, five per cent registered bond, maturing July 1, 1898	12,500 00	
Cambridge Contingent Loan, four per cent note, dated Dec. 1, 1883	200,000 00	
		$558,500 00
Town of Southboro, four per cent bonds, maturing March 25, 1890	6,000 00	
Town of Hyde Park, four per cent bonds, maturing July 1, 1891	5,000 00	
City of Salem, four per cent bonds, maturing July 1, 1892	17,000 00	
Town of Arlington, five per cent bonds, maturing July 1, 1898	24,000 00	
City of Boston, four per cent bonds, maturing Jan. 1, 1899	50,000 00	
City of Boston, four per cent bonds, maturing April 1, 1900	4,000 00	
City of Cleveland, O., three sixty-five one hundredths per cent bonds, maturing Sept. 1. 1902	3,000 00	
City of Providence, five per cent bonds, maturing July 1, 1906	50,000 00	
Town of Winchester, four per cent bonds, maturing May 1, 1908	10,000 00	
		$169,000 00
Amount carried forward		$727,500 00

Amount brought forward	$727,500 00
Cash in First National Bank of Cambridge on interest	26,442 00
	$753,942 00

The bonded water debt which the foregoing fund is expected to pay, matures as follows, viz: —

May 1, 1889, six per cent coupon	$112,000 00
July 1, 1890, six per cent coupon	60,000 00
May 1, 1891, six per cent coupon	50,000 00
July 1, 1892, six per cent coupon	335,000 00
April 1, 1894 six per cent coupon	150,000 00
Nov. 1, 1894, four per cent coupon	36,000 00
April 1, 1895, six per cent coupon	160,000 00
April 1, 1896,3½ per cent registered (or to April 1, 1911)	100,000 00
July 1, 1896, six per cent coupon	103,000 00
July 1, 1896, 3½ per cent registered (or to July 1, 1911)	75,000 00
July 1, 1897, six per cent coupon	16,000 00
July 1, 1898, five per cent registered.	12,500 00
Nov. 1, 1906, 3½ per cent registered	43,000 00
Oct. 1, 1907, four per cent registered	75,000 00
Oct. 1, 1907, four per cent registered	15,000 00
Nov. 1, 1907, four per cent registered	22,000 00
July 1, 1908, four per cent coupon	46,000 00
Aug. 1, 1908, four per cent coupon	25,000 00
May 1, 1910, four per cent registered	133,000 00
May 1, 1910, four per cent coupon	155,000 00
Total funded water debt	$1,723,500 00

As will be seen from the foregoing report, water bonds to the amount of $175,000.00 have matured and been paid. $73,000.00 in water bonds have been issued by the City Council, during the year. The net water debt is now $969,558.00 a reduction of $17,344.99 from the figures of one year ago.

Respectfully submitted,

WM. E. RUSSELL,
ALVIN F. SORTWELL,
WM. W. DALLINGER,
Trustees of the Sinking Fund of the Cambridge Water Works.

[illegible] PUBLICATIONS

CITY OF CAMBRIDGE.

[25]

ANNUAL REPORT

OF THE

WATER BOARD

TO THE CITY COUNCIL

FOR THE YEAR ENDING, NOV. 30, 1889.

BOSTON:
CASHMAN, KEATING & CO.
597 WASHINGTON STREET,
1890.

CITY OF CAMBRIDGE.

ANNUAL REPORT

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1890.

CAMBRIDGE WATER BOARD, 1890.

CHESTER W. KINGSLEY, *President.*

Members of the Board.

THE MAYOR, } *ex-officiis.*
PRESIDENT OF THE COMMON COUNCIL, }
GEORGE H. HOWARD (term expires 1890).
JAMES M. W. HALL (term expires 1891).
CHESTER W. KINGSLEY (term expires 1892).
LEANDER M. HANNUM (term expires 1893).
JOHN F. O'BRIEN (term expires 1894).
WALTER H. HARDING, Clerk.

HIRAM NEVONS, Superintendent of Works.

WALTER H. HARDING, Water Registrar.

Trustees of Sinking Fund of Water Loan.

THE MAYOR, CITY TREASURER, AND PRESIDENT OF THE COMMON COUNCIL, *ex-officiis.*

CAMBRIDGE WATER BOARD.

Date of election and length of service of members, 1865–1890.

CHESTER W. KINGSLEY	1865–	(Now in Office)
JOHN SARGENT	1865–1871	
A. K. P. WELCH	1865–1871	
ROBERT DOUGLASS	1865–1871	
SAMUEL SLOCOMB	1865–1876	
Z. L. RAYMOND	1871–	
HENRY L. EUSTIS	1871–1885	
J. WARREN MERRILL	1871–1881	
GEORGE P. CARTER	1871–1883	
JOHN H. LEIGHTON	1876–1879	
KNOWLTON S. CHAFFEE	1879–1889	
JAMES M. W. HALL	1881–	(Now in Office)
LEANDER M. HANNUM	1883–1884 1885–	(Now in Office)
JOHN F. O'BRIEN	1884–	(Now in Office)
GEORGE H. HOWARD	1889–	(Now in Office)

Presidents of the Board.

J. WARREN MERRILL	1865–1867	
EZRA PARMENTER	1867–	
JOHN SARGENT	1867-1871	
J. WARREN MERRILL	1871–1873	
CHESTER W. KINGSLEY	1873–1876	
GEORGE P. CARTER	1876–1883	
CHESTER W. KINGSLEY	1883–	(Now in Office)

REPORT

OF THE

CAMBRIDGE WATER BOARD.

To the Honorable City Council of the City of Cambridge :—

THE Water Board herewith presents to you its twenty-fifth annual report, being for the year ending Nov. 30, 1889.

TOTAL COST OF THE WATER WORKS.

Cost of the Works, Nov. 30, 1888, as per last year's report	$2,539,780 00
Expended during the year ending Nov. 30, 1889, ...	70,553 09
Making the total expenditure	$2,610,333 09

WATER BOND ACCOUNT.

Whole amount of Bonds issued	$2,459,900 00
Amount paid from Sinking Fund	828,400 00
Leaving unpaid Water Loan	$1,631,500 00
From this deduct the present value of the Water Debt Sinking Fund, as per the Trustees' account	728,658 53
Leaving the amount of Water Loan yet to be provided for by the Sinking Fund in the future	$902,841 47

Statement in brief of the transactions in connection with the Water Works for the year ending Nov. 30, 1889:

GENERAL CONSTRUCTION ACCOUNT.

RECEIVED.

From excess of rates, fines, etc.	$41,237 23
From sale of auxiliary pump	100 00
From Harvard College	499 41
	$41,836 64

EXPENDED.

Amount expended on general construction	$41,836 64

STONY BROOK CONSTRUCTION ACCOUNT.

RECEIVED.

Balance of appropriation of 1888	$15,403 23
From bonds issued	20,000 00
Premium on $20,000.00 Water Bonds sold	1,973 66
	$37,376 89

EXPENDED.

On Stony Brook account	$26,030 39
Balance unexpended to new account	11,346 50
	$37,376 89

FRESH POND LAND PURCHASES, ETC.

RECEIVED.

Balance of the appropriation of 1886	$1,268 78
Sales of apples, etc.	46 00
Sales of old houses on estates at Fresh Pond	599 00
Transferred from Maintenance account by order of the City Council	1,500 25
	$3,414 03

EXPENDED.

For purchase of estates bordering on the Pond, examining titles, etc.	$2,686 06
Balance unexpended carried to new account	727 97
	$3,414 03

WATER RATES, FINES, AND SUPPLY ACCOUNT.

RECEIVED.

From Water Rates	$222,753 60	
Less rates refunded	1,628 90	
		$221,124 70
Shutting off and letting on water, sealing, fines, and rent		745 00
From supply account		8,255 75
Accrued interest on bonds sold		298 00
From construction account		599 41
Sale of engine, hay, etc.		567 00
		$231,589 86

EXPENDED.

For General Construction account	$41,836 64
For Maintenance account	42,603 20
For Supply account	5,897 67
For interest on Water Loan	84,735 00
For paid into Sinking Fund, being three per cent. on $1,652,500	51,705 00
For transferred by the City Council to Fresh Pond Purchase account	1,500 25
Surplus of 1889, carried to the Sinking Fund	3,312 10
	$231,589 86

COMPARATIVE RECEIPTS.

Water rates for the year ending Nov. 30, 1889,	$221,124 70
Water rates for the year ending Nov. 30, 1888,	$211,156 27
Showing excess of water rates for 1889	$9,968 43

COMPARATIVE WATER SUPPLIED.

	Gallons.
Amount of water pumped in 1889	1,526,439,005
Amount of water pumped in 1888	1,514,483,582
Showing the increase for 1889 of	11,955,423

HOW THE WATER WAS USED.

	Gallons.
Amount of water sold by meter	319,139,800
Amount used in watering streets	51,377,498
Amount used for domestic, fire, fountain, and all other purposes	1,155,921,707
Making the total amount pumped	1,526,439,005

COMPARISON OF WATER CONSUMPTION, ETC.

	Gallons.
Daily average pumping for the year, for the high service through stand pipe	343,229
Daily average pumping for the year for the low or reservoir service	3,838,796
Making the daily average pumping	4,182,025

DAILY INCREASE IN CONSUMPTION OF WATER.

	Gallons.
Daily increase in consumption of water, 1886 over 1885	302,209
Daily increase in consumption of water, 1887 over 1886	476,307
Daily increase in consumption of water, 1888 over 1887	276,547
Daily increase in consumption of water, 1889 over 1888 was only	44,078

The falling off this year in the daily increase is almost unparalleled in our history, and can be accounted for only by the large amount of rainfall, as shown by the succeeding table, and the very remarkable fact, that there was not a dry month during the whole year, February, a winter month, showing the least rainfall of $2\frac{81}{100}$ inches, while all other months show from $3\frac{29}{100}$ to $8\frac{53}{100}$ inches, this last being in July, in midsummer. We have now had two remarkably wet seasons, the most so of any in our history as a water works. By reference to the table following, it will be seen that last year we had $60\frac{90}{100}$ inches rainfall, as against $60\frac{08}{100}$ inches this year, and both years were very much more than the two preceding years, resulting in using much less water by garden hose, and for watering streets.

RAINFALL AND HEIGHT OF WATER IN THE POND.

MONTHS.	RAINFALL.			WATER IN THE POND BELOW HIGH WATER, 16.85.		
	1887. Inches.	1888. Inches.	1889. Inches.	1887. Feet.	1888. Feet.	1889. Feet.
December	5.23	4.22	6.67	10.37	8.55	.91
January	5.28	3.32	6.64	10.80	5.37	.55
February	4.66	3.95	2.81	9.95	3.69	1.07
March	4.46	5.55	3.29	9.52	1.72	1.03
April	3.94	2.60	3.73	9.04	1.14	.88
May	1.79	6.36	5.65	9.30	.81	.87
June	1.86	3.25	3.44	10.20	1.12	.62
July	4.19	2.87	8.53	11.61	2.39	1.28
August	4.10	7.08	3.78	12.68	3.75	.84
September	1.36	8.28	5.30	12.73	3.24	2.06
October	3.22	4.83	3.73	12.66	1.37	2.81
November	3.90	7.70	6.51	12.05	1.25	1.75
Total for the year	43.99	60.01	60.08	10.91	2.87	1.22

STONY BROOK WATER SUPPLY.

We find, by the Engineer's report, that the daily consumption of water during the past year was 4,182,025 gallons, and by the Superintendent's report, we learn that the amount of water which daily run over our dam at Stony Brook, during the year, was 22,393,329 gallons, being more than five times the amount of water that we consumed during the same time; and showing an amount of water running over the dam to waste, so far as we are concerned, during the year, of more than 8,000,000,000 gallons of water. We do not forget that this is the result of a very wet season, and we have yet to prove our water supply in the dry seasons, which, in the course of nature, are sure to come in the future; but we think, with such a liberal margin as shown, there is no ground for fear, but rather it is a source of great satisfaction that our resources are so ample.

The quality of the water has given universal satisfaction, and the degree of hardness has been reduced more than one-half of what it was, when the water was introduced, thus making great improvement for washing and other domestic uses.

LAND TAKEN AROUND FRESH POND.

During the past year, the land which the city was authorized to take bordering on the Pond, and in that vicinity, has all been taken or purchased. What was purchased will soon be settled and paid for, while the ice-house properties and Dr. Somers, wait the slow process of the law, and nothing has yet been done in making a settlement with the Sisters of St. Joseph.

WORK DONE AROUND THE POND.

During the year, a decided advance has been made in filling and grading up the low places and bog-holes around the pond. Several acres have thus been graded and sown down to grass, presenting a neat, clean, and attractive surrounding to our

Storage Reservoir. Arrangements were made with the Fitchburg Railroad to widen our driveway at Boat-house nook; a new fence has been built along the railroad, and painted, which adds much to the convenience and appearance of the entrance to our driveway from Fresh Pond Lane.

FRESH POND DRIVE.

The drive cannot be extended any farther around the pond, until the ice-houses are removed; it is kept in good condition, and the number of pleasure riders about the pond is constantly increasing. We would repeat what we said last year, that there is one thing which seriously interferes with the pleasure and comfort of a drive around our pond, and that is the, at times, intolerable stench that comes from the Niles hog-slaughtering establishment, near Concord Avenue, and not far from Fresh Pond. At times this stench extends to the high land on Arlington, Washington, and other streets in that neighborhood, where are some of the finest residences in the city, and, at other times, the smell is blown over and across the pond to our engine house, and beyond, creating a nuisance in all that region. We think some way should be devised, at an early day, to abate this nuisance.

WORK AT THE ENGINE HOUSE.

The pump that was changed, last year, from a pumping capacity of 5,000,000 gallons in twenty-four hours, to that of 10,000,000 gallons in the same time, has proved an entire success, and has done a large part of the pumping the past year. A contract was made with the Blake Pump Manufacturing Company to change the other pump in the same way; the work has been delayed by the loss of some of the large castings, but is now going forward with the prospect of an early completion. When done, we shall have our pumping power for our low, or reservoir service, provided for many years to come, and well duplicated, as all pumping power should be, where the water supply of a large city is depending upon it.

OUR FEEDING RESERVOIR.

For several years this reservoir has shown signs of weakness, and occasional leaks breaking out has occasioned some anxiety and uneasiness. This year an examination was made, and the advice of M. M. Tidd, an expert engineer, was procured, and it was agreed by him, and our own City Engineer, that the wisest thing to do would be to drive a row of sheet piling, four inches thick, tongued and grooved, around those parts of the reservoir where any weakness had appeared, or where it would seem the bank needed strengthening the most; this has been done, and our anxiety is removed. There are portions of the outside walls that will have to be taken down and re-laid in cement. It was so late in the season when the piling was completed, that we were obliged to postpone repairing the wall until next spring, when we hope to complete these much-needed repairs on our reservoir.

DRAIN ON THE WEST SIDE OF THE POND.

We had provided for, and intended to have laid, a drain on the west side of the pond, to carry away the objectionable surface water, that comes from the Belmont district, including Richardson's Pond; but the water on the meadows, north of Concord Avenue, was so high that we could not do the work. We very much regretted this, as the water coming into the pond from this source is the only place where we have not succeeded in keeping all impure waters, of any amount, out of the pond.

WORK TO BE DONE.

We recommend the following work to be done the ensuing year: —

First. Construct a drain that will carry away the surface and drainage water coming from Richardson's Pond, and the Belmont district from our pond. We have already stated the reason why this was not done during the past year. We have had a careful survey made of the meadows, and the natural outlet of the waters from them. We find, through our City Engineer, that Alewife Brook has been filled, in its channel, to a depth of more than two feet in two places, and these obstructions prevent the water from draining off as it formerly did. We would recommend that steps be taken, at an early day, to dredge out Alewife Brook, down to its natural depth, so that waters may run off from the meadows, and give us a chance to put in the drain on the west side of the pond, and keep that large amount of water out of our water supply. It seems to us plain that this work should be done by the Sewer Department. Its necessity is imperative.

Second. The good results of the past year, in work done around the pond in filling and grading the low lands and nooks, shows the desirability of proceeding with this work as rapidly as possible. It is evident that this work must ultimately all be done, and we think the quicker it is done the better. This work done, after that the work of beautifying the surroundings of what will be known in the future as Fresh Pond Park, can be done gradually, a little each year. As all the work done about the pond is given to our citizens who need it most, we have no hesitation in recommending that liberal appropriations be made to enable us to prosecute these needed improvements with vigor the coming year.

Third. The removal of the auxiliary pumping house on the borders of the pond. This work we intended to have done last winter, but the ice did not freeze enough to make a scaffold for us to work upon. As soon as the ice is sufficiently strong, we shall make this removal this winter.

Fourth. In connection with re-laying a portion of the wall of the reservoir, already referred, there should be built a chronograph house near the stand-pipe, one that can be kept warm in the winter, so that we can know automatically what the consumption of water is during the night time, when the water is being drawn from the reservoir to supply the city. By this means any large leak in our pipes can be at once shown, and the necessary steps taken to locate and repair the damage as speedily as possible.

REMARKS.

We would again call your attention to Section 25 of the Water Ordinances, which reads "For water used by the city, an account shall be made, and the amount thereof shall be charged to the proper appropriations and credited to the Water Works." For the past four years the City Council have sent a communication to the Water Board, to have these charges abated, and we could not gracefully do otherwise than comply with their wishes. We called attention to this last year, but no notice seems to have been taken, practically, of our views. We now propose to specify more clearly our reasons for thinking that this course is not wise, and in some respects unjust.

First. It is contrary to the custom and usages of other cities, and does not give our Water Department a fair showing when compared with others.

Second. It is unjust to our water takers, for upon them is put the burden of supplying all departments of the city with water. In the city are many buildings, owned by non-residents. They have the benefit of our Fire Department and Police Department to protect and preserve their property. The Fire Department would almost be useless without water, and yet, under the present system, these non-residents escape any tax on that alone which makes the department efficient. Again, in watering the streets, a large number of our people get the benefit of the absence of dust, and improved streets, who pay no water tax, and they are by this system freed from paying their share towards this expense, all of which would be equitably met by observing the ordinance above quoted. We think the ordinance should be enforced, and when the water rates exceed, with this income added, what is needed to sustain the works properly, reduce the water rates. Such a course would be just and proper, in our judgment, and we think if our water takers understood the matter as we do, they would demand that they should not be called upon to pay more than their share towards running the city government. Another injustice we must call your attention to, which we referred to last year, but of which we find no practical notice, and that is, the thousands of loads of gravel, taken from the land that the Water Works have bought or taken (and are yearly paying the interest charge on the purchase money, and providing a sinking fund to pay the principal when due), and using the same on the street department, with no credit made to the Water Works, as evidently should be done. We think these matters are worthy of your attention, and so commend them to your good judgment.

Third. The last reason is, that the Water Works, for their own use in completing the improvements around Fresh Pond for the protection of our water supply, will need all the surplus, beyond necessary charges, for a few years to come. This is directly in the interest of the water takers, and we have no doubt that they will cheerfully pay the present rates for a few years longer, provided the money is expended for their benefit, after which the rates can be safely reduced.

REFERENCE TO OTHER REPORTS.

For the details of what has been done, and the present condition of the Water Works, we would refer you to the reports made to the Board by the Superintendent, Registrar, and Pumping Engineer, which we herewith transmit to you, and adopt as a part of our report to you.

In closing, we take pleasure in acknowledging the cheerful assistance rendered by our new City Engineer. While we lament and mourn the loss of Mr. Barbour, who so long and faithfully served the city, we are glad to have one to succeed him who was so long under Mr. Barbour's tuition, and has learned so many of his ways. Our City Solicitor has been constantly engaged in the litigation growing out of the land takings by the Water Board. Several have been decided, and so far as a settlement has been reached the city's interests seem to have been well represented and protected. The officers of the company, being the Registrar, the Superintendent, and those acting under them, have all discharged their duties faithfully. Mr. Brooks, our Pumping Engineer, is now engaged in superintending the changes being made at the engine house in Engine No. 1.

All of which is respectfully submitted,

C. W. KINGSLEY,
L. M. HANNUM,
JAS. M. W. HALL,
GEO. H. HOWARD,
JOHN F. O'BRIEN,
EDWARD A. BINGHAM.

REPORT

OF

THE WATER REGISTRAR.

WATER REGISTRAR'S OFFICE,
CAMBRIDGE, Dec. 7, 1889.

To the Cambridge Water Board :—

IN compliance with the requirements of the City Ordinance, I present the twenty-fifth annual report of the operations of this department, showing the receipts, expenditures, and abatements, together with a statement of the number of water takers, fixtures, etc., for the year ending Nov. 30, 1889.

Amount of bills remaining unpaid, Nov. 30, 1888:

Water rates	$132 45	
Meter rates	198 50	
Supplies and repairs	1,433 17	
Rent	45 00	

Amount of bills placed in hands of City Treasurer for collection from Nov. 30, 1888, to Nov. 30, 1889:

Water rates	179,720 38	
Meter rates	47,330 78	
Supplies and repairs	8,137 59	
Off and on water, rent, seals, and fines	877 50	
		$237,875 37

There have been collected:

Water rates	$222,753 60
Off and on water, rent, seals, and fines	745 00
Supplies and repairs	8,255 75

There have been abated:

Water rates	3,866 91
Supplies and repairs	39 82
Amount carried forward,	$235,661 08

Amount brought forward,	$235,661 08	
There remain unpaid :		
Water rates	559 45	
Meter rates	202 15	
Supplies and repairs	1,275 19	
Rent	177 50	
		$237,875 37

EXPENDITURES.

Construction account (Stony Brook)		$26,030 89	
Construction account (Fresh Pond land purchase)		2,686 06	
Construction account (general)		41,836 00	
Maintenance account, viz :			
Care and repairs	$26,683 87		
Pumping service	11,544 71		
Office expenses	4,374 62		
		42,603 20	
Supply and repair account		5,897 67	
			$119,053 82

ABATEMENTS.

Water rate bills to the amount of	$3,866 91	
Supply and repair bills to the amount of	39 82	
		$3,906 73

REFUNDS.

Water rates, to the amount of	$1,628 90	
Which amount, deducted from the receipts	222,753 60	
Leaves net receipts for water	$221,124 70	
Add off and on water, rent, seals, and fines	745 00	
Makes net receipts of "Rates, fines, etc."		$221,869 70

OFF AND ON.

Water has been shut off for non-payment of rates, or per order on account of vacancy, and seals have been applied to fixtures by request of owners, or occupants, as follows :

Supplies shut off in 1889	427
Supplies let on, shut off in 1889	328
Supplies let on, shut off in previous years	72
New supplies let on	379
Seal locks applied to fixtures in 1889	534
Seal locks removed, put on in 1889	272
Seal locks removed put on in previous years	177

COMPARATIVE STATEMENT.

	1888.		1889.	
Construction Account (Stony Brook)				
RECEIVED.				
From bonds issued (par value) additional appropriation by City Council	$25,000 00		$20,000 00	
From premium on bonds sold	2,368 00		1,973 66	
Sale of tickets, "Boston and Roberts"	9 00		—	
Balance of appropriation	51,070 92	$78,447 92	— 15,403 23	$37,376 89
EXPENDED.				
Sundry bills	$63,006 09		26,030 39	
Balance of appropriation	15,441 83	$78,447 92	11,346 50	$37,376 89
Construction Account (Fresh Pond Land Purchase.)				
RECEIVED.				
Balance of appropriation	$16,606 70		$1,268 78	
Sale of apples	62 65		46 00	
Sale of apples, and houses on Tudor and Middlesex Savings Bauk estates	—		599 00	
Transferred from maintenance account, by order of City Council	—	$16,669 35	1,500 25	$3,414 03
EXPENDED.				
Purchase of sundry estates, etc	$15,400 57		$2,686 06	
Balance of appropriation	1,268 78	$16,669 35	727 97	$3,414 03
Construction Account (General).				
RECEIVED.				
From excess of receipts from "Rates, fines, etc."	$24,256 84		$41,237 23	
From Town of Belmont (grading on Cushing street)	20 00		—	
Sale of auxiliary boiler and pump.	600 00		—	
Sale of "Follansbee" pump			100 00	
From Harvard College (extension of main pipes to "Holmes" field.		$24,876 84	499 41	$41,836 64
EXPENDED.				
Sundry bills	—	$24,876 84	—	$41,836 64
Maintenance Account.				
RECEIVED.				
Accrued interest on Water Bonds.	$228 00		$298 00	
From "Rates, fines, etc."	$211,811 22		221,869 70	
From sale of engine, hay, etc	—	$212,039 22	567 00	$222,734 70
EXPENDED.				
Care and repairs	$41,951 32		$42,603 20	
Interest on Water Debt	89,765 00		84,735 00	
Paid to Sinking Fund Commissioners	49,575 00		51,705 00	
Transferred to Fresh Pond Land Purchase account, by order of City Council	—	$181,291 32	1,500 25	$180,543 45
Excess of receipts	—	$30,747 90		$42,191 25
Supply Account.				
Received		$6,149 67		$8,255 75
Expended		5,216 31		5,897 67
Excess of receipts		$933 36		$2,358 08

COMPARATIVE STATEMENT — *Continued.*

1888.	Maintenance Account, excess of receipts	$30,747 90
	Supply Account, excess of receipts	933 36
	Excess of total receipts over total expenditures	$31,681 26
	Expended on Construction Account (general)	24,256 84
	Balance due Sinking Fund	$7,424 42
1889.	Maintenance Account, excess of receipts	$42,191 25
	Supply Account, excess of receipts	2,358 08
	Excess of total receipts over total expenditures	$44,549 33
	Expended on Construction Account (general)	41,237 23
	Balance due Sinking Fund	$3,312 10

The excess of receipts for 1889, as shown in the above comparative statement, amounting to $3,312.10, has been carried to the Sinking Fund, as required by law.

Statement of the yearly revenue received from water-rates since the purchase of the works by the city:—

From	April 28, 1865,	to Dec. 1, 1865	$32,367 19
"	Dec. 1, 1865,	" 1, 1866	40,073 27
"	" 1, 1866,	" 1, 1867	52,733 62
"	" 1, 1867,	" 1, 1868	63,747 42
"	" 1, 1868,	" 1, 1869	76,149.30
"	" 1, 1869,	" 1, 1870	92,606.95
"	" 1, 1870,	" 1, 1871	111,782 65
"	" 1, 1871,	" 1, 1872	127,201 30
"	" 1, 1872,	" 1, 1873	146,117 32
"	" 1, 1873,	" 1, 1874	153,634 27
"	" 1, 1874,	" 1, 1875	138,880 37
"	" 1, 1875,	" 1, 1876	179,166 76
"	" 1, 1876,	" 1, 1877	154,843 59
"	" 1, 1877,	" 1, 1878	157,443 91
"	" 1, 1878,	" 1, 1879	164,681 90
"	" 1, 1879,	" 1, 1880	173,325 49
"	" 1, 1880,	" 1, 1881	170,062 73
"	" 1, 1881,	" 1, 1882	177,430 80
"	" 1, 1882,	" 1, 1883	179,361 89
"	" 1, 1883,	" 1, 1884	161,526 27
"	" 1, 1884,	" 1, 1885	185,544 36
"	" 1, 1885,	" 1, 1886	199,404 43
"	" 1, 1886,	" 1, 1887	204,748 64
"	" 1, 1887,	" 1, 1888	211,156 27
"	" 1, 1888,	" 1, 1889	221,124 70

In addition to the manufactories, etc., supplied by meter, water is supplied to 15,040 families, 958 stables, with 2,766 horses and 326 cows, 241 shops, 537 offices and stores, by the following fixtures, viz.:—

18,025 faucets,
5,079 wash basins,
3,815 wash-tubs,
3,158 bath tubs,
812 slop closets,
8,922 pan closets,
9 hopper closets,
89 urinals,
35 yard hydrants,
4 fountains,
7 tumbler washers,
1,291 hand hose.

Also,

651 fire hydrants (beside 17 on private premises),
8 fire reservoirs,
16 drinking fountains in public squares.

The above schedule of fixtures is exclusive of the schoolhouses, engine houses, police stations, and other city buildings.

A careful house-to-house inspection for leaks and waste of water has been made, with the usual result of checking waste of water, and causing the repair of numerous imperfect fixtures. Incidental to this inspection, a considerable number of additional fixtures, etc., were found, for which water-rate charges have been made.

Respectfully submitted,

WALTER H. HARDING,

Registrar.

REPORT

OF THE

COMMITTEE ON ACCOUNTS OF THE CAMBRIDGE WATER BOARD.

We have examined the abstract of accounts as presented to us by the Water Registrar, covering the records of the past year.

We have compared it with the statements submitted to us by the City Treasurer and Auditor, and we find them to be correct and in agreement.

Annexed is the financial statement presented to us by the Water Registrar, and verified by us:

Amount of bills in hands of City Treasurer, Nov. 30, 1888:—		
For water-rates and rent	$375 95	
For supplies and repairs	1,433 17	$1,809 12
Amount of bills delivered to the City Treasurer for collection during the year ending Nov. 30, 1889:—		
For water-rates	$179,720 38	
For meter rates	47,330 78	
For supplies and repairs	8,137 59	
For off and on, rent and seals	877 50	$236,066 25
Total bills		$237,875 37
There have been abated	$3,906 73	
There have been refunded	1,628 90	$5,535 63
		$232,339 74
There have been collected	$231,754 35	
Balance uncollected Nov. 30, 1889, water-rates	761 60	
Balance uncollected Nov. 30, 1889, supplies and repairs	1,275 19	
Balance uncollected Nov. 30, 1889, rent	177 50	
	$233,968 64	
Less refunded as above	1,628 90	
		$232,339 74

JAS. M. W. HALL,
HENRY H. GILMORE,
EDWARD A. BINGHAM,
} *Committee on Accounts.*

Cambridge, Dec. 1, 1889.

CITY OF CAMBRIDGE,
OFFICE OF CITY TREASURER, Dec. 1, 1889.

To the Cambridge Water Board:—

GENTLEMEN: I give you herewith a record of the transactions between the Water office and the City Treasurer's Office during the year ending Nov. 30, 1889:

Gross collections for account of Water Works, rates, fines, etc.	$227,365 51
Abatement certificates received and allowed on water rates	3,866 91
Gross collection for account of Water Works "supply account"	8,295 57
Abatement certificates received and allowed for supply account	39 82
Refund checks have been received and paid amounting to	1,628 90
Uncollected bills in my hands, Nov. 30, 1889, for water rate account, amount to	761 60
Uncollected bills in my hands, Nov. 30, 1889, for rent account, amount to	177 50
Uncollected bills in my hands, Nov. 30, 1889, for supply account, amount to	1,275 19

Respectfully,
WM. W. DALLINGER,
City Treasurer.

CITY OF CAMBRIDGE,
OFFICE OF AUDITOR OF ACCOUNTS, Dec. 1, 1889.

To the Committee on Accounts of the Cambridge Water Board:—

GENTLEMEN: In accordance with your request, I herewith present a statement from my books for the year ending Nov. 30, 1889:

WATER WORKS (RATES, FINES, ETC.).

Amount of uncollected bills in City Treasurer's hands, Dec. 1, 1888		$375 95
Amount of bills placed in City Treasurer's hands for collection		$227,928 66
Total		$228,304 61
Amount collected by City Treasurer		227,365 51
Balance uncollected		$939 10
Amount of abatements allowed by City Treasurer	$3,866 91	
Amount of refunds paid by City Treasurer	1,628 90	

WATER WORKS (SUPPLIES).

Amount of uncollected bills in City Treasurer's hands, Dec. 1, 1888		$1,433 17
Amount of bills placed in City Treasurer's hands for collection		8,137 59
Total		$9,570 76
Amount collected by City Treasurer		8,295 57
Balance uncollected		$1,275 19
Amount of abatements allowed by the City Treasurer,	$39 82	

Respectfully submitted,

HARRY T. UPHAM,

Auditor.

ANNUAL STATEMENT OF THE WATER REGISTRAR

TO THE

COMMITTEE ON ACCOUNTS, DEC. 1, 1889.

Water-rates unpaid, Nov. 30, 1888	$330 95		
Rent unpaid, Nov. 30, 1888	45 00	$375 95	
Bills and refund checks placed in hands of City Treasurer, from Dec. 1, 1888, to Dec. 1, 1889: —			
Water-rates from annual ledgers	$168,422 70		
Water-rates from fractional ledgers	11,297 68		
Water-rates from meter ledgers	47,330 78		
Off and on water	351 50		
Rent	421 00		
Seals	105 00		
Refund checks	1,628 90	$229,557 56	
Total bills and refund checks on "Rates, fines, etc."		$229,933 51	
Supply and repair bills unpaid, Nov. 30, 1888	$1,433 17		
Supply and repair bills placed in hands of City Treasurer, from Dec. 1, 1888, to Dec. 1, 1889	8,137 59	$9,570 76	
Total bills and refund checks			$239,504 27

There has been collected:			
Annual ledgers	$166,303 49		
Fractional ledgers	9,357 03		
Meter ledgers	47,093 08		
Off and on water	351 50		
Rent	288 50		
Seals	105 00		
Total collections on "Rates, fines, etc."		$223,498 60	
Collections on supply and repair account		8,255 75	
Total collections		$231,754 35	
There have been refunded, water-rates	$1,628 90		
There have been abated, water-rates	3,866 91		
There have been abated, supplies and repairs	39 82		
There remain uncollected, water-rates	761 60		
There remain uncollected, supplies and repairs	1,275 19		
There remain uncollected, rent	177 50		
		$7,749 92	
			$239,504 27

Attest: WALTER H. HARDING,
Registrar.

REPORT

OF THE

SUPERINTENDENT OF THE CAMBRIDGE WATER WORKS.

CAMBRIDGE, NOV. 30, 1889.

To the President and Members of the Cambridge Water Board:

GENTLEMEN: I herewith present the annual report of the Superintendent, upon the condition of the works and the operations of the past year.

The total amount of water pumped was 1,526,439,005 gallons. Coal consumed per million gallons pumped, 1,543$\frac{98}{100}$ pounds.

Water sold by meter and that used for watering streets, 370,517,298 gallons, leaving, as the amount for domestic use, 1,155,921,707 gallons.

Number of gallons daily for each inhabitant on the whole amount pumped, 56$\frac{89}{100}$ gallons.

Number of gallons daily for each inhabitant on amount for domestic use, 43$\frac{8}{100}$ gallons.

STONY BROOK WORKS.

Water has been drawn from Stony Brook in quantities sufficient to keep the Cambridge Receiving Reservoir full. There have been but two days during the entire year when the water has not flowed over the waste way at Stony Brook, namely, June 2d, and June 7th; the water ceased flowing for a few hours only on each of these days.

The daily average number of gallons (by the month) flowing over the waste way was as follows:

December,	1888,	68,208,570	gallons.	June,	1889,	13,188,469	gallons.
January,	1889,	47,977,417	"	July,	"	4,632,430	"
February,	"	16,948,014	"	August,	"	20,286,869	"
March,	"	20,286,869	"	September,	"	8,282,222	"
April,	"	20,845,956	"	October,	"	13,188,469	"
May,	"	13,188,469	"	November,	"	21,686,204	"

Daily average amount wasted for the year, 22,393,329 gallons.

A rain gauge has been set near the dam, and a record of the rainfall is now being kept.

No repairs on these works have been needed. The walks have received the necessary care and the grass kept cut.

A wooden house has been built over the thirty-six inch waste gate in the cut east of South street, and a gear, with crank attachment, has been connected to the gate. These improvements add greatly to the convenience and ease in manipulating this very important gate.

Owing to the rough usage that was given to the roof while rebuilding the dwelling-house, the south roof will need to be reshingled during the coming year.

I would recommend that the bank adjoining the east end of the dam be graded and seeded down to grass.

STONY BROOK PIPE LINE.

No leaks have occurred on the Stony Brook pipe line.

All gates and blow-offs have been carefully inspected and their locations marked.

FRESH POND AND ITS SURROUNDINGS.

The old house on the Somers' estate, on Concord avenue, has been sold and removed. The stable connected with it has been moved about 500 feet nearer Concord avenue, in close proximity to the brick house. It was thoroughly repaired and fitted up, and is now occupied by this department as a stable for the single team that was purchased for general work on the roadway and surroundings of the pond.

The brick dwelling-house near Black's Nook has been repaired, painted, and arranged for two families, and is now occupied by a teamster, and a fireman at the pumping station.

The hay on the Somers' estate was cut and stored in the stable on Concord avenue; that on Kingsley, Tudor and Concord Avenue Parks was sold standing.

On March 8th, general work of improving the borders of the basin was commenced. The willow trees at the head of Black's Nook, near Concord avenue, were cut down, and a large amount of filling done in the nook, which has very much improved the appearance of this unsightly place.

That portion of the old gravel-pit, lying between the roadway and the Fresh Pond Ice Company, was graded and sown down.

The territory on the west side of the pond, lying between Eam's dam and Bright's Nook dam, has been graded and sown down.

The clay bank between the Fitchburg Railroad track and the fountain has been cut down, graded to correspond with its surroundings, covered with loam, and sown down to grass.

Total amount of grading done, about 14 acres.

The full width of pipe location at the head of Holworthy street cut has been filled in and graded. A substantial fence has been erected on each side of this location.

The old house on Cushing street opposite Cider Mill Pond was sold and removed. The material from the high bank on which this house stood has been used to fill in the pond back of Eam's Nook dam, and for filling and grading a long distance into the swamp. This unsightly pond has been entirely filled. The appearance of this portion of the borders of Fresh Pond has been greatly improved, and when the work is fully completed it will make a very attractive place.

The collection of lumber, brick, and stone near the Fitchburg Railroad depot has been removed, and the necessary grading done.

The Fitchburg Railroad Company signified its willingness to rebuild the fence on its location bordering the head of Boat-House Nook. Arrangements were made to deflect the line on the Company's location in order to give a uniform width to the driveway at that place, and permission was obtained to place pickets on the rail fence which was built by it. When this work was done, the whole fence was painted.

A guard fence has been erected on the west side of the road leading from the Fitchburg bridge to Boat-House Nook.

A cesspool has been built, and drain laid from it to the sewer in order to carry off the water from roadway, north from the gate near the depot.

An eight-inch by-pass has been connected around the thirty-inch gate in the gate-house on the south side of Fresh Pond, at the foot of Holworthy street cut. This has proved a complete success, as one man now can manipulate either gate with great ease without causing any shock or water-hammer from opening or closing the gates.

Signs have been placed over the entrances to the driveway around the Pond, on Concord avenue west of Fitchburg depot, at the Fitchburg depot, at Holworthy street cut, at Cushing street, near Cider Mill Pond, and at Concord avenue.

The water in Fresh Pond reached its highest point, 16.62, on Jan. 8th. Water was received from Stony Brook nearly all the year until late in September, when, anticipating the laying of a drain and to facilitate the work, the fountain was shut off, and the water allowed to run down to its lowest point, 13.72, which occurred Oct. 12. The average height was 15.63. The rainfall for the year was 60.08 inches.

PUMPING WORKS.

At this date the work of rebuilding No. 1 pump is being carried forward as fast as possible. Owing to accidents in casting the large water cylinders, there will be a greater delay in getting this pump into commission again than was anticipated when the contract was let.

While putting in the coal an accident occurred whereby the sixteen-inch end wall, dividing the boiler-room from the coal-shed, was broken down. About two thirds of this wall was rebuilt, and has been constructed so that a like accident may not happen again.

No other repairs have been made on the building. The balustrade and tin roof on the engine house will need extensive repairs during the coming season.

A dynamo has been attached to the small engine in the base- t, and the whole of the building is now lighted by electricity greatly diminishes the expense of lighting.

Drains were laid from all the conductors from the coal-shed, and two cesspools built to carry the surface drainage from the driveway.

The grounds around the engine house and Tudor Park have received necessary care. I most respectfully call your attention to the need of a good, substantial fence around these lots.

RESERVOIR.

The work of thoroughly repairing the reservoir was commenced on Sept. 10th. Four-inch sheet piling was driven as follows: fifty-one feet on the northeast corner, at a depth of twenty feet, one inch; north, from the centre wall on the east side, two hundred sixty-four and one-half feet, at an average depth of fourteen and two-tenths feet; across the north end one hundred and eighty-six feet, at an average depth of twenty-two eet, nine inches; around the corner and on the west side, on Reservoir street, sixty-four feet, at a depth of twenty-eight and two-tenths feet. This piling was driven about four feet outside of the capping-stone of the basin, and cut off about one foot below the surface; then a four-inch by eight-inch ribbon was bolted on each side, one foot below top of piling, thoroughly securing the tops.

Owing to the lateness of the season, the work of repairing the walls was postponed until the coming spring.

Water was discovered soaking through the bank on the east side in front of Mr. Reed's stable. As the indication of a leak was only perceptible when the reservoir was filled above the paving, the water in the reservoir was kept down in order to make investigation and repairs. It was found that there was a small opening in the cement joint connecting the bank paving with the capping-stone; this was repaired.

June 4th, water was discovered trickling from under the retaining wall on the east side near Mr. Gould's house. Like the other, this leak could only be seen when the reservoir was filled above the paving. On making repairs, a large quantity of the upper courses of stone was removed. It was found that the bank had settled from under the capping-stone, and from back of two rows of paving. This caused the cement seams to crack, and allow the water to trickle through. When this was repaired, an investigation was made and no other settlings or cracks were discovered.

The driving of the sheet piling is expected to prevent any farther leakage through the banks, and when the retaining walls are repaired, the reservoir will be in good condition and secure for several years.

HIGH SERVICE.

The following amount of pipe has extended the high-service system this year: 197 ft. of 4-in., in Bellevue avenue; 48 feet of 6-in. in Crescent avenue, and 714 ft. of 6-in. in Lambert avenue.

PIPE YARD.

The pit, back and under the stable, has been filled with gravel.

A cesspool has been built, and a drain laid to convey the drainage from the stable to the sewer.

The buildings will need painting during the coming season.

BROOKLINE STREET PIPE BRIDGE.

The pipe-house is in good condition, no repairs have been needed.

SIPHONS.

A new covering has been put on the siphon casing at Broad Canal, on Third street.

Accompanying this report is that of the engineer at the pumping station, and the following tables, showing the locations of meters, fountains, and stand pipes; the details of main and supply extensions, and the account of stock on hand.

Respectfully submitted,

HIRAM NEVONS,

Superintendent.

MAIN PIPE.

Main pipes have been laid in the following streets: 170 ft. of 4-in. in Allston street (renewal); 44 ft. of 8-in. in Albany street; 122½ ft. of 2-in. in Athens court; 3 ft. of 1½-in. and 662½ ft. of 6-in. in Auburn place; 171 ft. of 4-in. Auburn street near Sidney street; 3 ft. of 1½-in., 197 ft. of 4-in., and 5 ft. of 6-in. in Bellevue avenue; 3 ft. of 1½-in. and 233 ft. of 6-in. in Belmont street; 3 ft. of 1½-in. and 165½ ft. of 6-in. in Binney street; 279 ft. of 6-in. in Binney street at Third street; 110 ft. of 2-in. in Blackstone-street court; 34 ft. of 4-in. in Blanche street; 11 ft. of 6-in. and 2 ft. of 8-in. in Cambridge street at Harding street; 36 ft. of 4-in. in Carlisle street; 217 ft. of 4-in. and 8 ft. of 6-in. in Channing street; 60 ft. of 6-in. in Clay street; 6 ft. of ¾ in., 917 ft. of 6-in. and 2 ft. of 8-in. in Clinton street (renewal); 75 ft. of 4 in. in Columbia street; 114 ft. of 1¼ in. and 46 ft. of 4-in. in Cottage Park avenue; 120 ft. of 6-in. in Creighton street; 48 ft. of 6-in. in Crescent street; 97½ ft. of 6-in. in Cushing street; 3 ft. of 1½ in. and 170 ft. of 4-in. in Daniels' court (renewal); 6 ft. of 1½-in. and 205½ ft. of 6-in. in Dublin street; 2 ft. of 1½ in. and 209 ft. of 6-in. in Dudley street; 5 ft. of 6-in. in Eighth street; 3 ft. of 12-in. in Elmwood avenue; 121½ ft. of 4-in. in Emery court; 84 ft. of 4-in. and 5 ft. of 6-in. in Francis avenue; 2 ft. of 6-in. in Franklin street at Bay street; 60 ft. of 6-in. in Front street; 6 ft. of 6-in. in Hampshire and Bristol streets; 2 ft. of 3-in. and 12 ft. of 6-in. in Hampshire and Elm streets; 60 ft. of 6-in. in Harvey street; 39 ft. of 4-in. in Holly avenue; 338 ft. of 4-in. and 745 ft. of 6-in. in Holmes Field (for Harvard College); 15 ft. of 6-in. in Howard street; 3 ft. of 1½-in. and 131 ft. of 4-in. in Howland street; 201½ ft. of 4-in. in Huron street, west from Lake View avenue; 761 ft. of 8 in. and 191 ft. of 6-in. in Irving street; 22 ft. of 6-in. in Kinnaird street; 714 ft. of 6-in. in Lambert avenue; 3½ ft. of 1½-in., 191½ ft. of 6-in. in Lexington avenue; 113 ft. of 4-in. in Madison street; 48 ft. of 4-in. in Magee street; 3 ft. of 1½ in. and 126 ft. of 4-in. in Marsh court; 3 ft. of 1½ in. and 674 ft. of 6-in. in Middlesex street; 12 ft. of ¾-in. in Mt. Auburn street, corner of Putnam avenue; 155 ft. of 6-in. on premises of American

Rubber Works on Ninth street; 335 ft. of 6-in. in Park avenue; 3 ft. of 12-in. in Pleasant street at Green street; 3 ft. of 1½-in. and 154½ ft. of 6 in. in Portland and Albany streets; 24 ft. of 6-in., 4 ft. of 10-in. and 1,073 ft. of 12-in. in Portland street, between Cambridge and Spring streets; 172 ft. of 6-in. in Regent street; 12½ ft. of 6-in. in Rice street; 3 ft. of 1½-in., 49 ft. of 4-in. and 134 ft. of 6-in. in Richdale avenue; 3 in. of 1½ and 883 ft. of 4-in. in Sargent street; 516 ft. of 6-in. in Second street (renewal); 60 ft. of 8-in. in Sixth street, at Broadway; 238 ft. of 6-in. in Sixth street; 60 ft. of 6-in. in Smart street; 91 ft. of 4-in. in Springfield street; 7 ft. of 6-in. in Walden street; 7 ft. of 6-in. in Walden street, cor. Mead street; 81½ ft. of 6-in. in Woodlawn avenue.

The pipes in Allston street, Clinton street, Daniels' court and Second street have been renewed and enlarged. In Washington street the pipe was lowered, and in Albany street and Blanche street raised to accommodate the Sewer Department; in Putnam avenue the pipe was raised to new grade; and in Banks street the pipe was moved south, on account of new line of street.

NEW SUPPLIES.

Four hundred and twenty-eight new supplies have been laid, making a total of 10,158. Twenty-seven supplies have been renewed, of which six were enlarged. Two supplies have been extended. Thirty-one old supplies have been furnished with sidewalk shut-offs. Supplies in the following streets have been connected with the new main pipes: Allston street, Clinton street, Daniels' court, and Second street.

LEAKAGE.

Four hundred and ninety-one leaks have been stopped, namely: Two on 3-inch main, ten on 4-inch main, two on 4-inch joint, five on 6-inch main, one on 6-inch joint, one on 8-inch joint, two on 10-inch main, one on 12-inch main, one on 16-inch main, one on 30-inch main at Loafers' Bridge, Waltham, two at the reservoir, in the banks, sixteen on supplies in street, and four hundred and forty-seven on premises. Of these, four hundred and thirty-four on premises, which were reported by inspectors while canvassing, were repaired by owners or occupants.

A general inspection of pipes and fixtures has been made by the inspectors.

DRINKING FOUNTAINS.

The number of drinking fountains at this date is sixteen.

The stone drinking-trough, formerly in Lechmere square, is now located in North avenue, in front of Igo's, in place of old fountain and trough removed.

A new cast-iron fountain, of Jenks' make, the bowl of which has a capacity of about one hundred gallons, into which the water runs continually, has been set in the centre of Lechmere square.

The drinking trough at Brewer's, in Brattle square, has been removed; the drinking fountain still remains where located.

A new granite drinking fountain, which was presented to the city, has been set at junction of Craigie and Brattle streets.

By order of the City Government, the fountains in the following locations are to be kept running during the winter: Lechmere square, Inman square, Brattle square, Central square, North avenue at Igo's, and at junction of Main street and Broadway.

The location of the fountain at Brattle and Mt. Auburn streets has been changed to the corner of Mt. Auburn street and Coolidge avenue.

STANDPIPES FOR STREET-WATERING.

There has been no addition made to the number of standpipes. Two have been re-arranged, and furnished with Chapman valves for the accommodation of the Street Department.

GATES.

All the gates have been inspected, and put into good condition.

BOXES.

Sixteen hydrant, thirty-four iron and thirty-nine wooden, boxes have been set in place of worthless ones removed.

HYDRANTS.

Forty-one hydrants have been set during the year. Forty of these were of the Chapman Valve Company's make, and one of R. D. Wood & Co.'s. Ten hydrants have been removed, of which six were flush and four post, making the number now in use 648.

The hydrants removed were located as follows: Flush hydrants from North avenue and Rice street, Walden and Dublin streets, Walden and Mead streets, Dublin and Walden streets, Second and Cambridge streets, and Second and Otis streets.

A Chapman post hydrant on Murray street, broken by a team of West End street Railway Company, and a Perkins' post hydrant on Prison Point street, found broken by inspector, have been replaced by Chapman posts. An R. D. Wood & Company's three-nozzle post hydrant, removed from LaFayette square, has been located in Albany street. A post hydrant has been replaced by a Chapman post in Franklin street, at Bay street.

Of the hydrants set, two were on private premises, namely: Street Department on Tremont street, and American Rubber Company, on Ninth street.

The following hydrants are located on private premises:

Location.	Post.	Flush.
American Rubber Company	1	
Boston and Maine Railroad	3	4
Boston Rubber Works	1	
Boston Woven Hose Company	1	
Houghton & Company	2	2
North & Company	1	
Page, George G., and Company	1	
Street Department, Tremont street	1	
West End Street Railway Company	1	
Total	12	6

STREET RESERVOIRS.

The number of street reservoirs now in use is eight.

METERS.

The number of meters in use at this date is two hundred and thirty-one.

LIST OF METERS IN USE NOV. 30, 1889.

METERS.	LOCATION.	SIZE. INCH.	KIND.
Alghieri, Simon	Main st	¾	Worthington.
American Rubber Co	Ninth st	4	Union.
American Net and Twine Co	Third st	2	Worthington.
Andrews, D. H.	Ninth st	1½	Union.
Andrews, Dr. R. R.	Harvard st	⅝	"
Babb & Co., A.	Columbia st	1	Worthington.
Barbour, W. O	Osborn st	1	"
" " "	" "	⅝	"
Bay State Brick Co	Spruce st	1	"
Bird, H. M.	Broadway	⅝	Union.
Blake, George F., Manufacturing Co.	Third st	2	Crown.
" " " " "	Binney st	2	Union.
Blake, Irving	Church st	1	Worthington.
" "	" "	1	Crown.
B. & M. R. R. New Round House	Prison Point st	3	Union.
" " " Repair Shops	Bridge st	2	Worthington.
" " " Round-House	Prison Point st	2	"
" " " " "	" " "	2	"
" " " Paint Shop	" " "	1	"
" " " Car House	" " "	2	"
" " " Filling Locomotives	" " "	6	Union.
" " "	" " "	1	Crown.
Boston Ice Company	" " "	2	Union.
Boston Woven Hose Co	Hampshire st	4	Worthington.
" " " "	Berkshire st	⅝	Crown.
Boston Stamping Co	Third st	1½	Union.
Bowman, Henry	Frank st	1	Worthington.
Bragdon & Cooper	" "	⅝	"
Bullock, O. S.	Broadway	¾	"
Burton, A. & E.	Harvard st	¾	"
Cambridge Electric Light Co	Albro st	4	"
Cambridge Gas Light Co	Third st	2	"
" " " "	" "	1	"
" " " "	Ash st	¾	"
Cambridgeport Diary Co	Magazine st	1	"
" " "	Blackstone st	1½	Union.
Cambridge Hospital	Mt. Auburn st	1½	Crown.
Cambridge Y. M. C. A	Main street	2	Worthington.
Campbell, Wm. & Co	Osborn st	2	"
Carr Brothers	Lopez st	1	"
Catholic Young Men's Gymnasium	Prospect st	⅝	"
City of Cambridge. Webster School	Upton st	2	"
" " " Latin School	Lee st	1	"
" " " Ward 1 Building	Brattle st	1½	"
" " " Ward 4 Building	Central sq	1½	"
" " " Cemetery	Coolidge ave	4	"
" " " Fountain, near B. & L. R. R.	North ave	⅝	Union.
Chadwick Lead Works	North st	1	"
Chelmsford Iron Foundry	Bridge st	¾	Worthington.
Childs & Co	Main and Osborn sts	¾	Union.
Clark B. P. & Co.	Main st	1½	Worthington.
Close, George	Broadway	1	"
Cochrane Chemical Co	Potter st	1	"
Cofran, N. M.	Concord ave	1½	Union.
Coleman Brothers	Broadway	1	Worthington.
Coolidge & Caswell	Franklin st	2	Union.
Coolidge, J. G. Barn	Coolidge ave	2	Worthington.
" " Greenhouse	" "	1	"
Cushman Brothers & Co	Blanche st	¾	"
Dailey, C. W	Cambridge st	1	"
Damon Safe & Iron Works Co	Main st	1	"
" " " " "	" "	2	Union.
Daniels, Badger & Co	Albany st.	2	Crown.
Davenport, A. H	Cambridge st	2	Worthington.
" "	Otis st	⅝	Crown.
Davis, Curtis & Co	Broadway	2	Worthington.
Davis, J. C. & Co	"	2	Crown.
Day Cordage Co	Rogers st	2	"
Dee, T. W	Brattle st	2	Union.
Derby, H.	Main st	1	Crown.
Dolan, John	Decatur st	⅝	"
Dover Stamping Co	Pleasant st	6	Union.

LIST OF METERS IN USE NOV. 30, 1889 (*Continued*).

METERS.	LOCATION.	SIZE. INCH.	KIND.
Dow, Davis & Co	Portland st	2	Crown.
Dow, W. L. W	Deacon st	1	Worthington.
Downing, Theo	Eustis ct	1	"
Doyle, Wm. E	Cambridge st	2	"
Durite Manufacturing Co	Tannery st	2	Union.
Draper, Francis & Co	Otis st	⅝	Worthington.
East Cambridge Club Stable	First st	1	"
Episcopal Seminary	Brattle st	1½	"
Fairbanks, Mrs. N. J	Norfolk st	1	"
Furfey, James	Brookline st	¾	"
Gilmore & Eustis	Portland st	2	"
Goepper Brothers	Ninth st	1½	"
" "	Spring st	2	"
Gwynne & Co	Brattle st	1	Crown.
Harvard College. Boat-house	DeWolf st	1	Union.
" " Botanic Gardens	Garden st	1	Crown.
" " Boylston Hall	College grounds	2	"
" " Holmes Field	North ave	2	Union.
" " " "	Kirkland st	6	"
" " Holworthy Hall	College grounds	⅝	Worthington.
" " Holyoke House	Harvard st	2	"
" " In Yard	College grounds	1½	"
" " Gore Hall	" "	1	"
" " Jarvis Field	Everett st	1½	"
" " " "	" "	⅝	"
" " Memorial Hall	Cambridge st	2	"
" " Museum	Divinity ave	1	"
" " Thayer Hall	College grounds	1½	"
" " University Hall	" "	2	Union.
" " Sever Hall	" "	¾	Crown.
" " Stoughton	" "	¾	Worthington.
Harvard Piano Co	Main st	¾	Union.
Hawkins Machine Co	First st	1	Worthington.
Hazen, D. M	Elm st	1	"
Hewes, A. H. & Co	Crescent ave	1	"
Hersey, Ira G	Broadway	1½	"
Hilton, J. M	Harvard st	1½	"
Holt & Bugbee	East st	¾	"
Holton, F. H. & Co	Harvard st	2	"
Horgan, John	Main st	¾	Crown.
Houghton, H. O. & Co	Blackstone st	2	Worthington.
" " "	" "	⅝	Crown.
Howe & Putney	Distillhouse st	2	"
Ivers & Pond. No. 1	Maine and Albany sts	2	Worthington.
" " No. 2	Albany st	2	Crown.
" " Engine-room	" "	2	Union.
Irving & Casson	Otis st	1	Worthington.
Jackson, B. D	96 Putnam ave	⅝	Crown.
Jones, C. L. & Co	Pearl st	¾	Ball & Fitts.
Keeler & Co	Thorndike st	2	Union.
Kelley, James	North st	1	Worthington.
Kemp, Lysander & Sons	Davis st	1	"
Kendall & Sons. Engine-room	Main st	¾	"
" " " Machine-shop	" "	⅝	"
" " " Boiler-shop	" "	1	"
Kennedy, F. A. & Co	Green st	3	"
" " "	Franklin st	1½	Union.
Kennedy, Mrs. A	Farwell pl	1	Worthington.
Lamb & Ritchie	Albany st	1	Crown.
Linehan, Charles	Bridge st	1	"
Little, Brown & Co	Blackstone st	⅝	Thompson.
Low, J. W	Reed st	1½	Worthington.
Mason & Hamlin	Broadway	1½	Crown.
Maverick Oil Works	Sixth st	2	Worthington.
Middlesex County House of Correction	Second st	2	"
" " " " "	Spring st	4	Union.
" " Court House	Otis st	⅝	Worthington.
" " " "	Thorndike st	1	"
" " Registry of Deeds	Otis st	1½	"
Middlesex Dye Works	Sacramento st	1	"
Millan, Alexander	Brattle st	⅝	Crown.
Miller & Shaw	Broadway	1	Worthington.
Miller & Sons	Gore st	¾	Frost.

LIST OF METERS IN USE NOV. 30, 1889 (*Continued*).

METERS.	LOCATION.	SIZE. INCH.	KIND.
Moring, Mrs. A. L	Main st	1	Worthington.
Morrill & Allen	“ “	¾	Crown.
Morss & Whyte	Auburn st	4	“
Moulton, C. W. H	Gore st	⅝	Union.
Mt. Auburn Corp. Greenhouse	Brattle st	1	Worthington.
“ “ “ Cemetery	Mt. Auburn st	⅝	Desper.
Murdock, Walter H	Griggs st	⅝	Ball & Fitts.
National Linseed Oil Co	Fifth st	1	Worthington.
Norton, E. H	Windsor st	¾	“
“ “ “	Distillhouse st	1	“
O'Brien, John F	Coolidge ave	¾	“
“ “ “ Ross House	Broadway	⅝	“
Orr, Rev. Wm	Arrow st	1	“
Page, Carlos & Co	Broadway	1½	Union.
Page, George G. Box Co	Hampshire st	4	“
“ “ “ “ “	“ “	2	Worthington.
Parry Bros. & Co	Raymond st	¾	“
Phillips, George S	Main st	¾	“
Pike, O. A	North ave	1	“
Place, Charles	Norfolk st	¾	“
Porcellian Club	Harvard st	¾	Crown.
Purcell, H	Main st	⅝	Worthington.
Rawson & Morrison	Main st	¾	Union.
Reardon's, John, Sons & Co	Waverley st	4	Worthington.
Revere Sugar Refinery	Water st	3	“
“ “ “	“ “	3	Union.
Reversible Collar Co	Mt. Auburn st	1	Worthington.
Rideout, M. E	State st	1	“
Roberts Iron Works Co	Main st	1½	Crown.
Roberts, O. P	Brattle st	1	Worthington.
Rogers, heirs of George M	Washington st	3	“
Rutherford, R. J	First st	1	Crown.
Salvation Army	Prospect st	¾	Worthington.
Saurman, B. F	Gore st	¾	Union.
Schaeffer Electric Light Co	Main st	¾	“
Shaw, A. B. & E. L	Otis st	¾	Worthington.
Shorey, George L	Kinnaird st	4	Union.
Smart, D. C	Main st	2	Worthington.
Spaulding Cable Works	“ “	⅝	Union.
Spear's, Alden, Sons & Co	Rogers st	1½	Worthington.
Squire, John P. & Co	Gore st	1	“
“ “ “ “	“ “	2	“
“ “ “ “	“ “	4	Union.
“ “ “ “	“ “	6	Gem.
Sortwell & Co	Distillhouse st	2	Worthington.
St. Mary's Church	Norfolk st	2	“
Storr, D. C. Furniture Co	Thorndike st	¾	“
“ “ “ “	First and Thorndike sts.	⅝	Union.
Teele, Frank H	Lincoln ct	¾	Worthington
Thayer, Henry & Co	Broadway	2	“
Thurston, Hall & Co	Elm st	1	“
Tower, Sylvester	Broadway	2	“
Tracy, M. F	Boylston st	1	Desper.
Underhill & Anderson	First st	1½	Worthington.
“ “ “	First and Thorndike sts.	2	Union.
Union Glass Company	Webster ave	⅝	Worthington.
“ “ “	“ “	¾	“
Union Pacific Tea Co.	Main st	¾	Union.
Warren, J. H. Felton Hall	Cambridge st	1	Worthington.
W. E. St. Railway Co., Car-house	Camb. and Baldwin sts.	1	Balance Valve.
“ “ “ “ “ “	Dunster st	¾	Worthington.
“ “ “ “ Office	Harvard sq	¾	Crown.
“ “ “ “ Paint-shop	Dunster st	1	Worthington.
“ “ “ “ Repair-shop	“ “	1	“
“ “ “ “ Stable	Brookline st	1	“
“ “ “ “ “	Dunster st	1	“
“ “ “ “ “	“ “	¾	Hersey.
“ “ “ “ “	Murray st	1½	Worthington.
“ “ “ “ “	Baldwin st	1	“
“ “ “ “ “	Cambridge st	1	“
“ “ “ “ “	“ “	1	“
“ “ “ “ “	Mt. Auburn st	2	Crown.
“ “ “ “ “	North avenue	2	Worthington.

LIST OF METERS IN USE NOV. 30, 1889 (*Continued*).

METERS.	LOCATION.	SIZE. INCH.	KIND.
W. E. St. Railway Co. Stable.	Main st.	2	Worthington.
" " " " "	River st.	1	"
" " " " Waiting-room	Bridge st.	⅝	"
" " " " "	Main st.	⅝	Union.
" " " " Washing cars.	Murray st.	1½	Crown.
" " " " " "	" "	1	Worthington.
Wight & Scorgie	Mt. Auburn st.	⅝	Crown.
Wilkins, William	Earl st.	1	"
Wilson, John & Sons	Brattle st.	1	Union.
Whitney, H. W	Main st.	⅝	Crown.
Woods, John M	Bridge st.	1½	Worthington.
Young, C. F.	Davis st.	¾	Union.
Zerega, J. F	State st.	⅝	Worthington.

LIST OF DRINKING FOUNTAINS, NOV. 30, 1889.

Brattle street, junction of Craigie street.
Brattle street, east side at Brewer's Block.
Bridge street, junction of Cambridge street.
Broadway, corner of Norfolk street.
Central square, east side.
Central square, west side.
Garden street, at Washington Elm.
Hampshire street, junction of Broadway.
Harvard square, at the flag-staff.
Inman square, east side.
Main street, junction of Broadway.
Main street, junction of Mt. Auburn street.
Mt. Auburn street, corner Coolidge avenue.
North avenue, at Igo's.
North avenue, corner of Walden street.
Putnam avenue, corner of Brookline street.

LIST OF STAND-PIPES FOR STREET WATERING, NOV. 30, 1889.

Brattle street, near University Press.
Brattle street, corner of Sparks street.
Brattle street, near Fayerweather street.
Brattle street, near Fresh Pond lane.
Bridge street, junction of Cambridge street.
Broadway, near Third street.
Broadway, corner of Sixth street.
Broadway, corner of Winsor street.
Broadway, junction of Hampshire street.
Brookline, corner of Putnam avenue.
Cambridge and Baldwin streets.
Cambridge street, near Warren street.
Cambridge street, near Winsor street.
Cambridge street, at Inman square.
Columbia street, near Austin street.
Concord avenue, near Wyeth street.
Coolidge avenue, opposite entrance to Mount Auburn Cemetery.

Dana street, corner Chatham street.
Fresh Pond avenue, opposite Vassal lane.
Gore street, west of Third street.
Green street, near Western avenue.
Garden street, near Chauncy street.
Harvard street, corner of Prescott street.
Inman street, near Broadway.
Kirkland street, near Quincy street.
Main street, near Portland street.
Main street, near Hancock street.
Magazine street, opposite Warland street.
Mount Auburn street, near Athens street.
Mount Auburn street, near Willard street.
Mount Auburn street, corner of Coolidge avenue.
North avenue, near Common.
North avenue, corner Sacramento street.
North avenue, near Roseland street.
North avenue, near Beech street.
North avenue, near Spruce street.
North avenue, corner Norris street.
North avenue, opposite Tannery street.
Prison Point street, opposite Round House.
River street, near Putnam avenue.
Sixth street, near Thorndike street.
Spruce street, corner Cedar street.
Third street, near Rogers street.
Thorndike street, near Third street.
Western avenue, corner Howard street.
Walden street, corner Mount Pleasant street.
Washington avenue, near Lambert avenue.

MAIN PIPE LAID, NUMBER OF GATES AND FIRE HYDRANTS.

LOCATION.	IRON PIPE.		GATES.		HYDRANTS.	
	Length.	Size.	No.	Size.	No.	Size.
	Feet.	Inch.		Inch.		Inch.
Albany street	10	6	-	-	1	6
Albany street	44	8	-	-	-	-
Athens court	122½	2	-	-	-	-
Auburn place	3	1½	-	-	-	-
Auburn place	662½	6	1	6	1	6
Auburn and Sidney streets.	171	4	1	4	-	-
Bellevue avenue	3	1½	-	-	-	-
Bellevue avenue	197	4	1	4	1	6
Bellevue avenue	5	6	-	-	-	-
Belmont street	3	1½	-	-	-	-
Belmont street	233	6	1	6	-	-
Binney street	3	1½	-	-	-	-
Binney street	165½	6	1	6	-	-
Binney and Third streets	279	6	1	6	1	6
Blackstone street court	110	2	-	-	-	-
Blanche street	34	4	-	-	-	-
Cambridge and Harding sts.	11	6	1	6	-	-
Cambridge and Harding sts.	2	8	1	8	-	-
Carlisle street	36	4	-	-	-	-
Channing street	217	4	-	-	-	-
Channing street	8	6	-	-	1	6
Clay street	60	6	-	-	-	-
Clinton street	6	¾	-	-	-	-
Clinton street	917	6	2	6	1	6
Clinton street	2	8	-	-	-	-
Columbia street	75	4	-	-	-	-
Cottage Park avenue	114	1¼	-	-	-	-
Cottage Park avenue	46	4	1	4	-	-
Creighton street	120	6	-	-	-	-
Crescent street	48	6	-	-	-	-
Cushing street	97½	6	-	-	-	-
Daniels court	3	1½	-	-	-	-
Daniels court	170	4	1	4	-	-
Dublin street	6	1½	-	-	-	-
Dublin street	205½	6	-	-	1	6
Dudley street	2	1½	-	-	-	-
Dudley street	209	6	1	6	-	-
Eighth street	5	6	-	-	1	6
Elmwood avenue	3	12	1	12	-	-
Emery court	121½	4	1	4	-	-
Francis avenue	84	4	-	-	-	-
Francis avenue	5	6	-	-	1	6
Franklin and Bay streets	2	6	-	-	1	6
Front street	60	6	-	-	-	-
Hampshire and Bristol sts	6	6	-	-	1	6
Hampshire and Elm streets	2	3	1	3	-	-
Hampshire and Elm streets.	12	6	-	-	1	6
Harvey street	60	6	-	-	-	-
Holly avenue	39	4	-	-	-	-
Holmes Field	338	4	2	4	-	-
Holmes Field	745	6	1	6	2	6
Howard street	15	6	-	-	2	6
Howland street	3	1½	-	-	-	-
Howland street	131	4	1	4	-	-
Huron street	201½	4	-	-	-	-
Irving street	191	6	1	6	1	6
Irving street	761	8	1	8	1	6
Kinnaird street	22	6	-	-	2	6
Lambert avenue	714	6	1	6	2	6
Lexington avenue	3½	1½	-	-	-	-
Lexington avenue	191½	6	1	6	1	6
Madison street	113	4	1	4	-	-
Magee street	48	4	-	-	-	-
Marsh court	3	1½	-	-	-	-
Marsh court	126	4	-	-	-	-
Middlesex street	3	1½	-	-	-	-
Middlesex street	674	6	1	6	1	6
Mt. Auburn st. & Putnam av.	12	¾	-	-	-	-
Murray street	-	-	-	-	1	6

MAIN PIPE LAID, NUMBER OF GATES AND FIRE HYDRANTS.

LOCATION.	IRON PIPE.		GATES.		HYDRANTS.	
	Length.	Size.	No.	Size.	No.	Size.
		Inch.		Inch.		Inch.
Ninth street	155	6	–	–	1	6
Park avenue	335	6	1	6	1	6
Pleasant and Green streets	3	12	1	12	–	–
Portland street	24	6	–	–	1	6
Portland and Cambridge sts.	4	10	–	–	1	6
Portland and Thorndike sts.	1073	12	2	12	1	6
Portland and Spring streets.	–	–	–	–	1	6
Portland and Albany streets.	3	1½	–	–	–	-
Portland and Albany streets.	154½	6	1	6	-	–
Prison Point street	–	–	–	–	1	6
Regent street	172	6	–	–	–	–
Rice street	12½	6	–	–	1	6
Richdale avenue	3	1½	–	–	–	–
Richdale avenue	49	4	–	–	–	–
Richdale avenue	134	6	1	6	–	–
Sargent street	3	1½	–	–	–	–
Sargent street	883	4	2	4	1	6
Second and Charles streets	6	6	–	–	1	6
Second street	510	6	–	–	2	6
Sixth street	238	6	–	–	1	6
Sixth street at Broadway	60	8	2	8	–	–
Smart street	60	6	–	–	–	–
Springfield street	91	4	–	–	-	–
Tremont street	–	–	–	–	1	6
Walden street	7	6	–	–	1	6
Walden and Mead streets	7	6	–	–	1	6
Woodlawn avenue	81½	6	–	–	–	–

RECAPITULATION.

	12 in.	10 in.	8 in.	6 in.	4 in.	3 in.	2 in.	1½ in.	1¼ in.	¾ in.	Total.
Length in feet of iron pipe	1,079	4	869	6,203	3,001	2	232½	44½	114	18	11,567
Length in feet of iron pipe (renewals)	-	-	-	1,427	340	-	-	-	-	-	1,767
Number of gates	4	-	4	16	11	1	-	-	-	-	36
Number of hydrants	-	-	-	41	-	-	-	-	-	-	41

NEW SUPPLIES.

	6 in.	4 in.	2 in.	1½ in.	1¼ in.	1 in.	¾ in.	Total
Length in feet of pipe	134½	147	885	244	867	3,797	10,605½	16,680
Number of supplies	3	2	12	6	21	83	301	428
Number of stop and waste cocks	-	-	1	1	1	5	31	39
Number of drip valves	-	-	8	5	25	81	266	385
Number of screw cocks	-	–	16	6	23	81	293	419
Number of sidewalk cocks	-	-	-	-	-	85	293	378
Number of service boxes	-	-	-	-	-	-	387	387
Number of boxes, frames, and covers	-	-	-	-	-	-	46	46

LIST OF CHECK-VALVES.

OLD HIGH-SERVICE.

	Size in Inches.
Lake View avenue, 150 feet north from Huron street	10
Lake View avenue, 150 feet north from Brattle street	6
Fayerweather and Reservoir streets	6
Concord avenue, 135 feet south from Buckingham street	6
Garden and Linnæan streets	6
Raymond and Linnæan streets	6
Avon Hill and Linnæan streets	6
Arlington street, 230 feet west of North avenue	6
Mt. Vernon street, 100 feet west from North avenue	6
Mt. Pleasant street, 150 feet south from Walden street	6

NEW HIGH-SERVICE.

	Size in Inches.
Highland street, on old 12-inch main	12
Dana street and Broadway	4
Harvard street, near Hancock	6
Centre street, near Hancock	4
Dana street, near Main	4
Harvard and Ellery streets, two valves	6
Harvard and Trowbridge streets, two valves	4
Harvard and Ware streets	4
Harvard and Prescott streets	4
Quincy street, near Broadway	4
Broadway, on line of 6-inch pipe crossing College Grounds	6
Waterhouse street, near small common	6
Kirkland and Cambridge streets	10
Berkeley street, near Craigie	4
Appian Way, near Brattle street	4
Linnæan and Lancaster streets (old high-service extension)	6
Kirkland street and Frisbie place	4

STATEMENT OF STOCK ON HAND, NOV. 30, 1889.

WROUGHT IRON FITTINGS.

	6-in.	4-in.	3-in.	2½-in.	Total.
Caps	2	1	1		4
Couplings	2	2	4	2	10
Elbows	2	2	4	4	12
Nipples	2	8	7	4	21
Plugs				1	1
Valves				1	1

For Street Mains (Iron Pipes and Fittings).

	48 in.	36 in	30 in.	24 in.	20 in.	16 in.	12 in.	10 in.	8 in.	6 in.	4 in.	3 in
Bends			1	2	2		3	6	6	2	8	
Blow-off branches												
Caps							7	5	18	10	15	
Cast iron plugs					2							
Clamps for cement pipes					4						1	
Check-valves				2				1				
Clamp-sleeves				5	4							
" "				2-6	2-6	4	4	6	4	9	12	9
Clamp-sleeves for cement pipe (Hawkes)								6	8	7	3	
Crosses					1-20		5-4	7-6	3-4	8-6	14-4	
"						3-6	4-12	4-8	4-8	8-4		
"						1-12		2-10				
Drain offsets										8		
Elbows				1		1	1	2	8	5	1	
Gates								2	1	6	10	1
Offsets								6		13	16	
Reducers					2-8		2-8	2-8				
"				1-12	2-12	1-16	10-6	1-6	4-6	10-4	6-3	
Sleeves			1	4	3	2	9	7	16	23	27	
Tees				3-6	2-20	1-6	3-12	7-6	12-8	13-6	20-4	2-3
"				1-8	2-6					7-4		
"				1-16	1-12							
"			1-6	1-20								
"				1-24								
Wooden plugs				2	2	1	3	5	13	31	20	3
Y. branches				1	1-12				4			
Pipe—12 feet lengths	2		1		15	5	110	100	76	120	367	

For Supplies (Galvanized Pipe and Brass Fittings).

	2-in.	1½-in.	1¼-in.	1-in.	¾-in.	½-in.	
Air chamber				45	98	32	
Bushings, different sizes						262	
Caps		5	16	15	17	37	
Chapman stop and waste valves	14	17	11	23	24		
Check valves	1	1	1	4	3		
Couplings	55	98	16	44	135	15	
Crosses	4	5	16	4	12		
Driving-cocks bushed and threaded				8	1		
Elbows	20	24	30	38	91	5 and 5	¾x½
Faucets				12	12	12	
Fountain cocks					6		
Gates	2						
Hose nipples					28		
Hydrant cocks		27		6	8		
Lead connections			1	14	10		
Lead connection unions					36		
Nipples	115	140	77	206	120		
Pipe, galvanized, in feet	954	1026	481	432	561		
Plugs	18	18	18	18	19	2	
Self-closing fountain faucets						6	
Screw-cocks for cement pipe		4		20			
" "	7	35	9	9	44		
Sidewalk cocks				5	55		
Sill cocks					8		
Sill valves, nickel plated					6		
Street elbows				12	24		
Stop and waste cocks	8	10		8	6		
Tees	4	3	14	28	81	40	
"	25-1	24-¾	40-¾	32-¾	40-½		
Unions	55	20	6	55	57	3	
Reducing couplings, different sizes						100	
et end of rods						17	
d-pipes						100	

STOCK IN SHOP AND YARD.

1 ⅝-inch Worthington meter.
1 ¾-inch Worthington meter.
3 1-inch Worthington meters.
1 1½-inch Worthington meter.
3 ⅝-inch Union Rotary meters.
2 1½-inch Union Rotary meters.
1 2-inch Union Rotary meter.
1 ⅝-inch Crown meter.
1 4-inch Crown meter.
1 ⅝-inch Ball and Fitts meter.
1 ¾-inch Frost meter.
1 3-inch Frost meter.
14 pipe wrenches.
2 nut wrenches.
7 monkey-wrenches.
10 gate wrenches.
5 blow-off wrenches.
3 1-inch cock wrenches.
4 2-inch cock wrenches.
22 small tee wrenches.
4 flush hydrant wrenches.
1 meter box.
11 iron boxes.
2 hydrant boxes.
3 cock boxes.
40 wooden gate boxes.
54 large frames and covers for gates.
12 small frames and covers for gates.
36 large frames and covers for hydrants.
216 risers for wooden boxes.
370 seals.
1 stove with fixtures.
1 tank for measuring water.
1 work bench.
1 work bench with drawers.
1 clock.
6 chairs.
30 lanterns.
4 tool bags.
2 trowels.
2 hay forks.
1 rake.
2 ladders.
2 barrels charcoal.
1 barrel clay.
3 casks cement.
3 hydrant valves.
25 stops and wastes for flush hydrants.
7 hydrant bodies.
15 post hydrant jackets.
26 post hydrant rods.
1 set hydrant tools.
2 1-inch garden hydrants.
4 lead kettles.
3 ladles.
200 lbs. lead pipe.
1,500 lbs. lead.
30 lbs. packing.
2 diaphragm pumps with hose
2 hand pumps.
7 thawing out pumps.
450 thawing out pipes.
1 ratchet for tapping main pipe.
3 machines for tapping cement pipe.
1 drilling machine with drills complete.
2 tapping machines for supplies, with taps and drills.
4 hooks for tapping main pipe.
2 2-inch taps and drills.
1 threading machine with dies.
10 plates with dies.
20 lbs. sheet rubber packing.
1½ cords wood.
Lot of skid timber.
Lot of 4-inch lumber.
150 feet of cypress.
Lot of blocks and wedges.
Lot of counters and ratchets.
Lot of old junk.
5 drinking fountains.
2 hatchets.
2 axes.
1 hay cutter.
1 claw-hammer.
6 sledge hammers.
2 paving hammers.
3 hand hammers.
8 screw drivers.
4 saws.
Plane, square, level, etc., for carpentering.
1 lathe, with usual chucks and tools.
1 water motor.
Lot of block stones.
4 wooden horses.
3 oil cans.
1 tool chest.
11 pails.
6 iron bars.
4 tamping bars.
1 chain tongs.
1 washer cutter.
2 platform scales.
2 grindstones.
3 bench vises.
3 furnaces.
2 hoes.
2 small derricks.
2 breast derricks.
3 pair rubber boots.
9 pipe cutters.
6 pipe tongs.
1 floating hook.
1 large mall.
9 spindles for 4-inch and 6-inch gates.
2 sets main pipe tools.
1 30-inch overflow bell.
9 chains.
36 shovels.
3 snow shovels.
32 picks.
9 trench rammers.

2 paving rammers.
2 elevating screws.
5 small oilers.
1 sand sieve.
1 thawing boiler and furnace.
13 shut-off rods.
13 2-inch offsets.
150 feet 2½-inch hose.
4 rope tackles.
1 blow-off hose.
150 feet ¾-inch hose.
4 horses.
1 truck.
3 wagons.
4 harnesses.
2 sleighs.
7 blankets.
2 buffalo robes.
3 lap robes.
3 oil coverings for horses.
1 carry-all.
2 buggies.
1 robe chest.
Lot of meter clocks.
2 paving heaters.
Lot of 2-inch sheet piling.
2 ropes.
2 double-runner sleds.

TOOLS AT FRESH POND.

BRICK HOUSE STABLE, CONCORD AVENUE.

1 horse.
1 harness.
1 cart.
2 blankets.
1 hay-rack.
1 curry-comb.
1 brush.
1 card.
6 forks.
6 rakes.
1 shovel.
1 hand force-pump.
50 feet of rope.
3 pails.
1 grain chest and measures.
1 oil covering for horse.
1 harrow.
15 tons hay.

STOREHOUSE — BLACK ESTATE.

1 mowing machine.
2 scythes.
2 scythe snaths.
1 handsaw.
1 watering cart.
1 road roller.
5 wheelbarrows.
1 ton second crop hay.
1 grindstone.

ON THE WORKS — FRESH POND.

2 tool chests.
1 stone boat.
3 plows.
1 iron scraper.
12 round painted picks.
5 chisel painted picks.
7 chains.
3 bars.
1 sod cutter.
40 shovels.
1 screen.
3 axes.
1 sledge.
2 iron wedges.
4 grub hoes.
2 paving hammers.
2 rammers.
2 levels.
1 monkey wrench.
1 hand hammer.
3 water pails.

FOUNTAIN — GATE HOUSE.

4 hoes.
6 gravel rakes.
3 shovels.
1 small skiff, with oars.
3 pails.
1 keg wire nails.

TOOLS AT STONY BROOK.

1 row-boat and oars.
3 gate wrenches.
2 pair grab hooks.
1 rope fall.
1 chain fall.
40 feet of rope.
1 ladder.
2 chairs.
1 sprinkling can.
1 reamer.
1 whipple-tree and traces.
1 drag.
3 rakes.
1 fork.
2 scythes and snath.
2 whet-stones.
1 sod knife.
2 lanterns.
1 stove and fixtures.
17 cast-iron signs.
1 monkey-wrench.
1 cold chisel.
1 grindstone.
2 shovels.
3 picks.
1 iron bar.
1 oil can.
1 oiler.
1 lead kettle.
1 ladle.
1 tip cart.
2 lengths 36-inch pipe.
12 lengths 30-inch pipe.
2 30-inch sleeves.
2 pike poles.
1 sickle.

REPORT

OF THE

ENGINEER OF PUMPING STATION.

PUMPING STATION, CAMBRIDGE WATER WORKS,
Dec. 6, 1889.

Hiram Nevons, Esq., Superintendent: —

SIR: The machinery at the pumping station is in good condition. Engine No. 2, which, at the date of last report, had been just started, has pumped the larger part of the water used during the past year, and has continued to work very satisfactorily.

The board having voted to change engine No. 1, in the same manner as was done with engine No. 2, a contract was made with the George F. Blake Manufacturing Company, they being the lowest bidders, and the contractors are now at work on the engine.

An independent air pump and condenser has been attached to the high-service engine, enabling that engine to be run after the other engines are stopped.

After careful investigation of the matter of lighting the pumping station by electricity, it was decided to accept the proposition made by Mr. George E. Bowers, of Fitchburg, Mass., to furnish dynamo, storage battery, thirty incandescent lamps, and one arc lamp, and to install the same in first-class manner. The plant has been in operation since July, and has given perfect satisfaction.

Following will be found a statement of the expenses at the pumping station, with the usual tables.

Respectfully submitted,
EDWIN C. BROOKS,
Engineer.

STATEMENT.

$968\frac{1183}{2240}$ tons Cumberland coal at $4.56	$4,416	48
$83\frac{1380}{2240}$ tons Cumberland coal at $4.72	394	67
Oil, waste, packing, etc.	314	19
Repairs on engines and boilers	127	33
Repairs on buildings and care of grounds	99	31
Tools	40	02
Electric light plant	512	61
Gas	187	60
Salaries	5,452	50
Total	$11,544	71

ENGINE RECORD, POND LEVELS, AND RAINFALL.

DATE.	LOW SERVICE ENGINES.						HIGH SERVICE ENGINE.			Total Water Pumped.	Daily Average Water Pumped	TotalCoal Con-sumed.	Daily Average Coal Con-sumed	Average Heig't of Pond.	Rain-fall.
	No. 1.			No. 2.											
	Total Pumping Time.		Water Pumped.	Total Pumping Time.		Water Pumped.	Total Pumping Time.		Water Pumped.						
	Hrs.	Min	Gallons.	Hrs.	Min	Gallons.	Hrs.	Min	Gallons.	Gallons.	Gallons.	Lbs.	Lbs.	Ft.	In.
1888.															
December	340	25	78,665,700	91	25	34,205,600	431	50	9,653,088	122,524,388	3,952,400	200,300	6,461	15.94	6.67
1889.															
January	397	15	93,776,400	39	40	14,867,600	436	55	9,947,789	118,591,789	3,825,542	196,300	6,332	16.30	6.64
February	226	30	52,698,000	151	25	60,601,750	377	55	8,218,483	121,518,233	4,339,937	190,900	6,818	15.78	2.81
March	286	50	65,047,200	115	30	45,569,600	402	20	8,753,414	120,370,214	3,882,910	186,300	6,010	15.82	3.29
April	284	00	65,336,400	104	30	43,136,500	388	30	9,032,813	117,505,713	3,916,857	181,900	6,063	15.97	3.73
May	209	45	46,869,600	185	25	74,704,850	446	00	11,527,891	133,102,341	4,293,834	201,400	6,497	15.98	5.65
June	118	35	27,603,900	252	45	98,022,100	444	20	10,720,742	136,346,742	4,544,891	195,700	6,520	16.23	3.44
July	81	35	17,568,300	287	50	108,728,400	461	15	11,483,328	137,780,028	4,444,517	204,200	6,587	15.57	8.53
August	8	45	1,893,900	334	20	122,766,600	461	00	11,259,110	135,919,610	4,384,504	203,900	6,577	16.01	3.78
September	1	30	325,800	323	10	120,107,350	444	30	11,890,547	131,323,697	4,377,456	199,100	6,637	14.79	5.30
October	28	00	5,725,800	305	35	113,219,150	496	00	12,224,909	131,169,859	4,231,282	209,500	6,758	14.04	3.73
November	3	15	679,200	294	30	108,040,900	480	00	11,566,291	120,286,391	4,009,546	187,300	6,243	15.10	6.51
Total	1,986	25	456,190,200	2,486	05	944,970,400	5,270	35	125,278,405	1,526,439,005		2,356,800			60.08
Daily Average	5	27	1,249,836	6	49	2,588,960	14	26	343,229	4,182,025				15.63	

STOCK ON HAND, DEC. 1, 1889.

940 tons Cumberland coal, 10 gallons cylinder oil, 23 gallons engine oil, 23 gallons kerosene oil, 5 lbs. tallow, 140 lbs. cotton waste, 72 lbs. rubber packing, 80 lbs. Usidurian packing, 10 lbs. square flax packing, 38 manhole gaskets, 26 handhole gaskets, 2 steam gauges, 10 lbs. soap, 4 brooms, 125 fire brick, 2 bbls. brimstone, 300 lbs. bolts and nuts, 1 lot iron pipe, 1 lot pipe fittings.

TOOLS, FURNITURE, AND INSTRUMENTS.

1 18-in. x 10-ft. engine lathe, with chucks, tools, etc., 1 5-in. x 6-in. engine, 1 lot shafting, pulleys, and belting, 1 grindstone, 2 vises, 2 vise benches, 3 die plates and dies, 1 set pipe taps, 1 set hand taps, 2 pipe cutters, 14 pairs pipe tongs, 3 hand hammers, 1 copper hammer, 18 cold chisels, 1 hand bellows, 15 files, 6 screw wrenches, 5 Stillson wrenches, 2 clamp screws, 1 sledge, 2 ratchets, 24 drills, 1 breast drill, 2 jack screws, 6 steel bars, 2 soldering irons, 4 cylinder-head cranes, 12 eye-bolts, 75 starting bolts, 1 chain fall, 3 tackles, 2 ladles, 4 wooden horses, 1 oil cabinet, 1 set measures, 1 lot oil cans, 1 oil pump, 1 carpenter's bench and tools, 2 axes, 2 hand axes, 2 hatchets, 1 set fire tools, 1 coal car, 1 pair platform scales, 3 wheelbarrows, 10 scoop shovels, 1 tube scraper, 1 forge, 1 anvil, 5 pairs tongs, 2 hand chisels, 2 lawn mowers, 1 steel rake, 1 wooden rake, 4 forks, 1 weeder, 1 spade, 2 picks, 5 ladders, 3 step-ladders, 200 ft. 2-in. hose and pipe, 2 water coolers, 6 fire pails, 15 water pails, 1 window brush, 1 floor brush, 1 dust brush, 1 feather duster, 1 dust pan, 1 lot cocoa matting, 5 mats, 6 spittoons, 1 lot gas fixtures, 1 dynamo, 26 cells Julien storage battery, 1 arc lamp, 1 lot incandescent lamps and fixtures, 4 bracket lamps, 3 lanterns, 3 hand lamps, 1 desk, 2 tables, 2 clocks, 12 chairs, 1 barometer, 1 hygrophant, 1 thermometer, 2 rain gauges, 1 snow gauge.

TOOLS, ETC., AT ENGINE HOUSE AT POND.

1 12-in. centrifugal pump, 1 No. 2½ Blake pump, 1 Hancock inspirator, 1 belt clamp, 1 stove and pipe, 1 cot-bed and bedding.

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